PROPERTY OF THE JEFFERSON
COUNTY MEDICAL LIBRARY.
DO NOT TAKE OUT OF LIBRARY.

PROPERTY OF THE JEFFERSON
COUNTY MEDICAL LIBRARY.
DO NOT TAKE OUT OF LIBRARY.

TRANSACTIONS

OF

The American Urological Association

ELEVENTH ANNUAL MEETING
AT NEW YORK CITY
APRIL 2, 3 AND 4, 1912

EDITED BY
CHARLES GREENE CUMSTON, M. D.

PROPERTY OF THE JEFFERSON
COUNTY MEDICAL LIBRARY.
DO NOT TAKE OUT OF LIBRARY.

363179
21. 2. 39.

PRINTED FOR THE ASSOCIATION AT THE
RIVERDALE PRESS, BROOKLINE, MASS.
NINETEEN HUNDRED AND TWELVE

616.6061

RC
870
A49
v.6

OFFICERS FOR 1911–12

PRESIDENT

Louis E. Schmidt . . . . Chicago

VICE-PRESIDENT

G. Shearman Peterkin . . . Seattle

SECRETARY

H. A. Fowler . . . . Washington

TREASURER

Homer G. Fuller . . . Washington

In Memoriam, 1911-1912

JOAQUIN ALBARRAN

MAX P. VAN DER HORCK

CONTENTS.

	Page
Why Urology should be considered a Specialty. Presidential Address by Louis E. Schmidt	1
Further Report on the Phenolsulphonepthlein Test in Surgery of the Genito-Urinary Tract. Louis E. Schmidt and Herman L. Kretschmer	13
Intravenous Administration of Phenolsulphonepthalein for Ureter Catheter Study of the Renal Function. E. L. Keyes, Jr., and A. R. Stevens	31
Albumen Determination as an Aid in Diagnosis of Kidney Lesion. George W. Warren	41
Two Cases of Diverticulum of the Bladder treated by Operation. Arthur L. Chute	58
Vesical Neoplasms. J. F. McCarthy	69
The Training of the Urologist. Hugh Cabot	87
Some Genito-Urinary Surgery recently done in Vienna and Berlin. Charles E. Barnett	94
A Case of Burn of the Urethra with Lunar Caustic followed by a complete Cast of the Urethra. Victor Cox Pedersen	104
Epididymo-Orchitis complicating Typhoid Fever. George C. Smith	111
The Time for Prostatectomy. Benjamin Tenney	119
Conclusions Drawn from One Hundred Prostatectomies. Oliver C. Smith	125
A Case of Unrelieved, Unexplained Vesical Tenesmus. Francis R. Hagner	140
Points in Prostatic Surgery. G. Kolischer	144
Report of a Case of Double Ureter with Intravesical Ballooning of its Lower Ends. Hugh Hampton Young	161
The Removal of Ureteral Stone by Cystoscopic Methods. Bransford Lewis	169
Further Observations on Ureteral Obstruction in Early Intermittent Hydronephrosis. O. S. Fowler	186
Fragment of Glass Irrigating Nozzle Removed from the Bladder without Open Operation. Victor C. Pedersen.	207

Page

An Instance of Acute Retention due to an Unusual Cause. William Warren Townsend 209
The Micrococcus Catarrhalis as a Cause of Urethritis in the Male. Winfield Ayers 221
Report of a Case of Gonorrhœal Pyelitis. Louis C. Lehr 236
Further Experience with Liquor Aluminum Acetate in Colon Bacillus Infection of Urinary Tract. Irvin S. Koll 242
The Effects of Ureteral Ligation, Experimental and Clinical. J. Dillinger Barney 251
A Case of Malaria Simulating Renal Calculus. E. O. Smith 263
Perinephritis. Henry Jacobson 266
The Management of Gonorrhœal Rheumatism. Eugene Fuller 274
Experimental Investigation of the Value of Hexamethylenamin (Urotropin) and Allied Compounds. Curtis F. Burnam 286
A Short Account of the Early History of Suprapubic Cystotomy. Charles Greene Cumston 305
Observations on Value of Specific Complement Deviation Reaction in Gonorrhœa, as an Aid to Clinical Diagnosis. James A. Gardner and G. H. A. Clowes..... 337
Experiences with the Gonorrhœal Complement Fixation Test. R. B. H. Gradwohl 360
Further Report on the Gonorrhœal Complement Fixation Reaction. Louis E. Schmidt..... 370
Sigmoido-Vesical Fistula: Report of Two Cases. Joseph L. Boehm and John McH. Dean 386
Ileo-Vesical and Appendico-Vesical Fistulæ complicated by Stone in the Bladder. Paul M. Pilcher..... 397
Microscopical Urinalysis as an Aid to Diagnosis of Diseases of the Urinary Tract. Louis Heitzmann 401
Radiographs of the Bladder and Bladder Neck. Benjamin S. Barringer and Geo. M. MacKee..... 408
New Occluding Ureteral Catheter and Cystoscopes for Functional Renal Tests. Edgar Garceau 415
Roster of the American Urological Association 422

TRANSACTIONS OF THE AMERICAN UROLOGICAL ASSOCIATION.

WHY UROLOGY SHOULD BE CONSIDERED A SPECIALTY.

PRESIDENTIAL ADDRESS BY
LOUIS E. SCHMIDT,
CHICAGO, ILL.

I do not wish to enter into any controversy as to what requirements are necessary to become a specialist. Thorough training as a general practitioner is, in my opinion, not only desirable, but absolutely imperative. This is probably more essential in our field than in some of the others, on account of its border-line phases. I am inclined to believe that the more thoroughly we are acquainted with those specialties which come in contact with our own field, the greater is our success. It must also be recognized that the medical, as well as the surgical, training is absolutely necessary. Naturally, general hospital experience following the regular medical school work and then general practice is of the greatest benefit. This is then to be followed by post-graduate work. Not only should the masters of genito-urinary diseases be closely followed, but the specialties which so often touch upon this field in one way or another should by thoroughly gone into. Finally, independent investigation should be undertaken.

From all this it can readily be inferred that a certain number of years must elapse after graduation before one can become a specialist. Yet, before we can regard ourselves as such on a firm footing, there must be provided by hospital authorities and teaching institutions departments which will permit of study and instruction.

On reading Doctor Cabot's last year's address, with the discussion, I find that he has thoroughly defined what a specialty is. In addition, our shortcomings have been pointed out, so I shall not refer to them. However, to be fair, the truth of the latter must be admitted.

In France, as far back as a quarter of a century, urological work was fairly well established and numerous individuals of renown were interested in it. On account of the vast advances and the many special features of diagnosis and treatment, the French Urological Association was organized over twelve years ago. The German Urological Association was formed in 1908. It must be admitted that as a rule the Germans do not take quickly to any flighty suggestion. I am quite certain that only after due consideration and recognition of the great importance of the study of the genito-urinary organs, as well as on account of the introduction of so many new methods of examination and treatment, and hence, the necessity for special skill in their application, did this organization meet with great success.

The American Urological Association was founded in 1902 and had its first meeting in New York City. Our organization is modeled after that of the French Association. At the beginning there were some who had their misgivings as to its success, but during the last few years I am convinced there has been no doubt as to its stability. And why is this? Simply because there are now a great number of individuals

of recognized ability connected with the Association who devote their time and attention to the study, teaching and practical work of this department of medicine. With this success — showing the interest already developed in this field of work — there must come in due course of time a more general recognition by those who always taboo specialism.

In 1910 there met in Paris a representative body of men from various countries. All had at heart the advancement of Urology, and it was then that the International Urological Association was organized. Since these Associations meet and transact scientific work along definite lines, and since all the meetings have been equally successful, I am quite certain that it is a sign of progress and recognition of the necessity of concentration in all that pertains to genito-urinary diseases.

There are among us those who possibly oppose the name Urological Association, yet there are, as I have pointed out, an International, a German, and a French, as well as our own American Urological Association. In the Constitution of our organization, Article I, Section 2, it is stated that the object of this Association "shall be the study of the medical and surgical diseases of the urinary organs in both sexes." I am quite certain that those of us who consider this field of work of sufficient magnitude to designate it a specialty are not quite satisfied to be bound by these limitations. Yet, the Association can confine itself within certain limits if it so desires. Since it ought to be the representative body of this specialty, I believe it to be well worth while to consider whether or not its scientific discussions should be confined within these lines.

Undoubtedly, our Association took its name from the French organization, and this in turn from the word urology. Now, what do we understand by the

study of urology? It certainly has reference to the urine of both sexes, both in disease and health. Yet the accepted meaning of the term and the object of the Association does not include all this. It should be so broadened that the accepted meaning of the word and the object of the Association would include the study of the medical and surgical diseases of the urinary organs in both sexes, the study of the urine in health and disease, and the study of the medical and surgical diseases of the male genitalia. While we are gathered here we should unite on definite ground and let it be known what we really wish to include in our special field of work.

Under the circumstances, I think it quite advisable to review a little history. First of all, let us discuss the term urology in further detail. Undoubtedly this word does not cover the field as it is regarded at the present time. However, it did cover the entire field at the time it was introduced. In other words, many things have been added in the gradual development of the specialty, so that now it includes the diseases of the genito-urinary tract in the male and only the urinary tract in the female. In this metamorphosis much of interest and importance has been added to our field of work by the internist as well as by the surgeon, by the gynæcologist, the neurologist and the venerealogist. Credit must be given to all these. Thus, great help has been rendered from without, and our specialty has not been built up only by those who have been solely interested in it. However, I believe this is also true of all other special fields of work.

Urine and its various physical appearances were certainly discussed as far back as the time of Hippocrates. Naturally, the urine in disease — color, taste, and odor — was carefully noted, and certain deviations from the normal were considered indicative of

certain diseases. Later analytic methods were employed to diagnosticate disease, and the urine was carefully studied both physically and chemically. Clinicians and physiological chemists still study the urine both in health and disease. In cases of fever, digestive disturbance, rheumatism, diabetes, and every other known disease, the urine is examined in order to find some deviation from the normal.

Formerly the kidneys were regarded as mere filters to permit the passage from the blood and the lymph of substances undesirable for the body. As this was recognized to be incorrect, the study of the urine and the urinary organs became more complicated. The microscope came into use and the significance of blood, pus, epithelial cells and casts and cylindroids were studied. Bacteriological methods permitted examination for the disease-producing micro-organisms. The study of pathology has given much information, and experimental medicine and experimental pathology have solved problems. Gradually in the study of the urine, certain problems were encountered: whether changes in the urine were due to local disturbances or to general conditions; also to classify the symptomatology as related to diseases of the urine and urinary tract. For the beginning of these we need look back scarcely more than half a century.

I do not wish to burden you with too many details nor to take up your valuable time, yet I think it only fair to point out some of the epoch-making names. I will not refer to ancient or mediæval history, for in those days there was no correlation, only the discovery of isolated facts. Yet all due recognition and credit should be given for these, for they aided materially in bringing the subject up to the point where the foundation could be laid upon which our modern urology is based.

The discovery of the microbic causes of urinary

diseases dates back to Pasteur, who showed, in 1859, that the micrococcus urea is the cause of urinary decomposition. Neisser, in 1879, demonstrated the gonococcus as the cause of specific urethritis. Further bacteriologic investigation showed the bacillus of tuberculosis, the colon bacillus, the staphylococcus, the streptococcus and other pathogenic organisms as the causes of disease in the urinary tract. By modern methods of diagnosis it has become possible to demonstrate the location and character of the invasion. Modern therapy, as regards bacterial diseases of the urinary tract, has been benefited by the epoch-making investigations of Koch and Wright. In pathological anatomy, Virchow, Rokitansky, English, Klebs, Tandler, Zuckerkandl and Stoerch have demonstrated much that is of value to our work of today. For the study of the urine and the technical methods of examination we owe much to Salkowsky, Ludwig, Neubauer and Simon. Regarding the Stoffwechsel and the blood diseases in connection with urinary findings and physiological chemistry we are indebted to von Norden, Salkowsky and von Koranyi, while the clinical study was materially advanced by Bright, Guyon, Ricord, Thompson, Furbringer, Rosenstein, Senator and Posner. The development of modern methods of diagnosis we owe, to a large extent, to Nitze, Brenner, Kolischer, Albarran, Grünfeld, Oberlaender, Casper, Roentgen, and Koranyi. It is unnecessary to describe these in detail, as it would include the history of the development of the cystoscope, the urethroscope, and the catheterizing and operative cystoscopes, and also the very important aids of radiography and methods of examination in physiological chemistry. In the study of the cause, the pathology and the treatment of gonorrhœa, Neisser, Finger, and many others have become known the world over.

I regret to state that many individuals who have identified themselves with urology have neglected all else except the treatment of specific urethritis; further, that in their zeal they have forgotten all else. Their skill did not extend to even the ordinary surgical complications. In fact, they remained with the syringe and the irrigator. It is such as these, who, unfortunately for us, attaching themselves to our growing specialty, have not only dragged us down, but have kept us down with a weight that has required considerable effort for its overthrowing. I believe that the conditions which accompany or follow a gonorrhœa, as well as the urethritis itself, demand our most painstaking care. We who so often see, and know by sad experience, the terrible results cannot deny the importance of careful study and earnest attention to this, the most common of all venereal diseases. To neglect all but the urethritis, to have the patient keep busy with the syringe and the doctor with the irrigator, is to the detriment of the development of our specialty. We should no more expect the physician to devote his entire time to treating uncomplicated gonorrhœa, than to have individuals who devote their time exclusively to the surgical complications of gonorrhœa.

I am quite certain that the genito-urinary organs in the male and the urinary organs in the female are of much importance to the individual. It is true that they are often affected by local conditions, but not infrequently we meet with general disturbances. It is here that the true clinician can show his worth — to correlate the facts, to establish the nature of the existing conditions, and to treat accordingly. Here the special training to which I have referred comes into play.

In the history of medicine it has often been mentioned that operations for stone in the bladder were

carried out by specially trained men — the same is true for the operation of litholapaxy, and for the treatment of stricture with either the knife or the sound. In order to deal correctly with these problems today, nobody will doubt that at least a certain amount of specialistic knowledge is essential. In order to carry out modern ideas, a certain amount of experience is desirable to attain ideal results.

Take the often quoted question of stone in the bladder. In my opinion there is no doubt that there are methods of choice in certain cases, and again certain other methods of procedure are indicated under other conditions. In order to decide these questions correctly, it must be admitted that special study as well as special training is necessary. So with the question of stricture of the urethra, with tumor of the bladder, and I might add, with every known pathological condition which is met with in the practice of medicine. This fact is so thoroughly recognized by the general surgeon that we now find the chiefs of clinics surrounded by men trained in limited fields. I need only mention cystoscopy, as this seems to be a weak point with many who practice surgery, yet it is a recognized method of examination of prime importance. I am firmly of the belief, that in order to interpret the findings correctly, it is desirable to be an expert in all the methods of examination which may be required in the consideration of any case. In other words, I do not believe that the operative work should be done by one who cannot make the necessary examinations, because such an operator could not, from his personal knowledge of the case, arrive at correct conclusions. In such a case, the operator is compelled to take the word of the diagnostician.

As our specialty includes many so-called borderline diseases, the question of medical or surgical

treatment often arises. There can be no greater skill required than for deciding questions of this kind. It cannot be done without special study and ample experience. There are other diseases, such as those involving the female genitalia or neurological conditions, which are productive of urinary symptoms and have also been classified as border-line affections, and they, too, require skill for their recognition. Here, again, the question of operative or non-operative treatment may arise. Take, for instance, the surgery of the kidney, which practically dates back only half a century. It was Simon who in his classic work brought up the possibilities of this field of work. Surgeons took kidney surgery up but slowly. Even with the advent of the era of antisepsis and asepsis, no great strides were made. It was not until the introduction of modern methods of diagnosis, which permitted of greater exactness, that the surgery of the urinary tract made great progress.

It is by means of the cystoscope that the surgeon is able to establish the correct diagnosis of all bladder diseases. The ureteral catheter makes it possible to establish the presence of one or two kidneys and also the character of the separately collected urines. With the advent of the functional diagnosis of these organs much food for thought has been introduced, and at the same time, a great deal of valuable information has been gained. The introduction of each new physical, chemical or bacteriological method of examining the urine, as already mentioned, made various facts appear in different lights. Only for the past fifteen years have the X-ray modes of examination been in use. During the past few years this method has been highly developed, so that now momentary pictures can be taken at times of inspiration and expiration which will show the mobility of the kidney or whether it be stationary. The

ureteral catheter with fuse wire mandrin was suggested in 1900 in connection with the X-ray work. During this same period, naturally, many new methods of treatment of both bladder and kidney diseases were developed. These have required special instruments, and these in turn, special training for their use. Among these I need only mention, as an example, the treatment of papillomata of the bladder by fulguration.

With all this advance in one special field of work, is it any wonder that the surgery of the urinary tract became important? Surgery became so prominent that it appeared to overshadow every other aspect of urology. I regret to state that I believe there are still those who belong to this period. As far as I am concerned, I wish to state most emphatically that I believe it to be an incomplete field of work — although I must admit that it may be the most fascinating to some. I think we should not confine our efforts to any portion, but to the field in its entirety, as it is embraced in the term urology, as explained at the outset of these remarks.

There are specialties, such as neurology, in which the physicians are simply diagnosticians. This is also true of those who devote themselves to gastro-intestinal diseases. But in both of these branches there are already pioneers who do their own operating. It will be only a question of time until all will agree to the necessity of complementing diagnostic ability with operative skill. And why should it be otherwise? There are other fields of special work in which this is the established practice. The otologist of today is his own operator and the same can be said of the laryngologist and the ophthalmologist. It is only necessary to recall the strides which gynæcology has taken. It originally, I might say, was a non-operative specialty; but today every gynæcologist must

be an operator as well, or he no longer can be classed as a progressive. I am certain there are but few who will contend that it is not to the interest of their patients. And why should it be otherwise with our chosen field? Because there are those who will call our specialty one of a border-line type? There can be no question of the truth of this contention, as the diseases of the genito-urinary tract lead out in all directions and bring us in contact with other specialties. I need only mention, as illustrations, the many urinary symptoms in the female that are due to genital disturbances; in neurological conditions there are oftentimes sexual as well as urinary symptoms that require careful consideration in order to exclude other possible causes. In a few instances, cystoscopic findings have been sufficient to establish an early diagnosis of locomotor ataxia. In the field of general medicine numerous instances could be cited which involve questions of the genital and urinary organs.

In abdominal surgery, whether in the male or the female, there are many times when a thoroughly trained urologist can be of the greatest service to the patient. The general surgeon so often fails to use the special methods of examination that are in common use by the urologist, and so, many points are overlooked. It is not uncommon to find that a chronic seminal vesiculitis is mistaken for an appendicitis. Cases of ureteral stone can simulate appendiceal attacks. Here the ureteral catheter with the lead mandrin can often be of service. Misplaced kidneys can readily be located by the same means. Differential diagnosis of gall stones and of ovarian tumors are occasionally made with methods which are in common use by the urologist. Only too often we learn that a patient with intermittent hæmaturia has been told to return at a time when there is blood

in the urine. If the intervals are long, great advance in the progress of the disease may take place during this time. Those using the well-known functional kidney tests recognize a mode of investigation that is useful in such cases.

This state of affairs will continue until we are sufficiently organized and generally recognized. By our own efforts we must show the necessity for specially trained individuals to direct the teaching in the various institutions of medicine, the necessity for the recognition of this particular line of work as a department in hospitals, and finally, to have institutions which will permit of, as well as assist in, scientific investigation.

I trust that I have outlined in a sufficiently clear manner what is now included in urology, and also that I have shown it to be a specialty on a firm footing. However, since it is, with its present limitations, only a recent branch in medicine, I have taken the liberty of directing our attention to some of its various angles which have been neglected, particularly by those who have turned their time and attention in one direction only. I have also shown that we have given help to, as well as received it from, those branches of medicine which border on the domain which we wish it understood to be our special field.

FURTHER REPORT ON THE PHENOLSULPHONEPHTHALEIN TEST IN SURGERY OF THE GENITO-URINARY TRACT.

LOUIS E. SCHMIDT AND HERMAN L. KRETSCHMER,
CHICAGO, ILL.

As the problem of determining the functional capacity of the kidneys is one of much importance, it was thought that a further report of this work as carried out by us, on a varied lot of cases, would be interesting as well as instructive. It is not our desire at the present time to draw any positive conclusions from the work as reported by others — Cabot, Keyes, Geraghty and Rowntree — or by ourselves. We wish merely to present the facts as gained in our routine work.

We fully appreciate the shortcomings of the functional tests in use at the present time, and know the objections raised by those who oppose a so-called dye test. Nevertheless, it is our belief that in order to come to any conclusion — even if only in the distant future — it is not only desirable, but absolutely necessary to have large series of cases from which to ascertain certain facts and so make it possible to arrive at a result, whether favorable or not to this test. It has been, and still is, our belief that the phenolsulphonephthalein test is the test of choice in preference to all other tests of this character. Our reasons have already been given in our previous communications.

There can be no argument raised, at least for the present, as to whether or not one should depend on

the results of the test in given cases. At the present time, we are certain that our decisions in operative procedures — whether a nephrectomy or a nephrotomy is contemplated, or whether or not a prostatectomy is to be carried out, or whether a case is or is not a good surgical risk — are not reached by means of this test.

It is needless to state that these problems are all more or less solved in part by our physical examinations and detailed clinical findings of all kinds and in part by our experience. However, it is our wish, as far as it is possible, to bring this test up to such a point that it will at least be of more value than any other known functional test as an aid in arriving at such conclusions.

We can refer to cases (as has been done by others) where operation became imperative and was carried out in spite of a retarded excretion and a very low percentage of excretion in one or two hours, in which the surgical result has been satisfactory; and on the other hand, death has occurred from anuria following operation in cases where the excretion was prompt and a large percentage of dye was obtained in one or two hours. In most of these latter cases there have been factors which one would regard as bad signs when drawing up one's conclusions in order to decide whether or not to operate. In other words, we are not in a position at the present time to determine the value of the information obtained from the test, but it is our hope and wish that a correlation of facts may, in the future, be of some service in surgical work of this kind. Post-mortem work as well as specimens obtained at the time of operation have already demonstrated certain facts. It is therefore from clinical work and post-mortem and surgical specimens that we will be able to draw valuable conclusions.

The technic employed in this series of cases has been similar to that in our previous series, except that the drug has in every case been introduced intravenously. We have already given our reasons for considering this the method of choice.

We have grouped our cases as follows: —

I. Kidney and Ureteral Cases.
II. Bladder and Obstructive Cases.
III. Miscellaneous Cases with Cryoscopy.
IV. Miscellaneous Cases.

We have adopted this classification as a matter of convenience, the necessity for the differentiation of the first two being obvious. In Group I it is always imperative to collect the urine from each kidney separately. In Group II this is not necessary.

We have also a series of cases, including kidney, as well as bladder and obstructive cases, and also a few miscellaneous cases, in which cryoscopy has been carried out. In order to compare the figures it becomes necessary to examine the charts. In this way some interesting figures have been obtained. In last year's series we had comparisons with the indigo-carmine and the phloridzin tests.

Preliminary Remarks to Chart I.

In this series we have sixteen cases, including the commoner kidney and ureteral conditions. We do not believe it possible to strike an average regarding either the time of elimination or the total amount of drug excreted in a group of cases in which the lesions are so various. For example, it would not be proper to compare the time of elimination of a bilateral case with that of a unilateral case; and again, it would not be proper to compare cases with normal urines to cases in which the urine contains a large amount of pus. For these reasons we will select a few cases and discuss them individually.

Chart I, Case 3. Acute exacerbation of a chronic nephritis. The time of appearance was delayed; appearing on the right side in eight minutes, with 3.705 per cent excretion, whereas on the left side the time of appearance was nine minutes and the total excretion was 7.06 per cent. Ten days later, without ureteral catheterization, the time of appearance was seventeen and one-half minutes and the total percentage of dye excreted was diminished.

It is alleged that in certain cases the ureteral catheter causes a delayed time of appearance as well as a diminished amount of drug excretion. This can hardly hold in the case under consideration, as the second reading was made from urine obtained directly from the bladder.

The physical examination showed the patient to be in an extremely bad condition. Because of the excruciating lumbar pain and the presence of blood in the urine, a double-sided decapsulation was undertaken. There was gradual diminution of the amount of urine secreted until a complete anuria supervened, which existed for several days. The patient died ten days after operation.

Chart I, Case 4. This case is of interest because of the fact that although he had a very severe degree of chronic interstitial nephritis (as proved by microscopic examination of an excised piece), the time of appearance of the drug was short and the total percentage of drug excreted was good, 65.5 per cent.

Chart I, Case 7. This case is interesting because of the difference in time of appearance between the two sides; namely, left side nine minutes and right side three minutes. The percentage of excretion on the right side was 41.49 and on the left side 10.04. The time of appearance was three times as long on the left side and only twenty-five per cent as much drug was excreted by the left kidney. These figures were

verified by operation. There remained only a shell of the left kidney, with only a very small amount of secreting kidney tissue.

Chart I, Case 9. This is a case in which a technical error could easily have been overlooked. The first reading showed 20.83 per cent of dye excreted from the right ureteral catheter and 30.12 per cent from the bladder urine. The next reading showed 47.61 per cent excreted from the right kidney. Unless care is taken in interpreting these figures one might easily conclude that the 30.12 per cent represents urine from the left kidney only, as only the right kidney was catheterized. That this is not the case can be explained by two facts. First, repeated previous catheterizations of the left ureter showed the absence of urinary secretion from this side. Second, in this examination a plain and not a flute-end catheter was used, which easily accounts for the leakage, and substantiates what we said in a previous article about the desirability of using flute-end catheters for this work.

Chart I, Cases 11 and 12. These show the functional activity of the remaining kidney, the diseased member having been removed two and three years respectively prior to carrying out this test. The patients were in good health, the urinary reports were negative. In one instance there is a delay in the time of appearance, namely eight minutes, and the total output is a little low, 48.5 per cent. The other patient was a younger man — the dye appeared in two and one-half minutes and the total output was 72 per cent.

Chart I, Case 15. This was a pyelitis of pregnancy. Both sides required seven minutes for the appearance of the dye (after subcutaneous administration) and the total output was but 40 per cent, with a difference of 10 per cent in favor of the left side.

Chart II.

Chart II comprises bladder and prostate cases. The technic for collecting has been continued along the same lines as previously described. The readings were made from the mixed specimens. The time of appearance of the dye varied from one to seventeen minutes. The percentage excreted varied from 12.44 to 91.7 per cent. In this series there were three deaths from anuria.

Chart II, Case 1. Time of appearance four and one-half minutes; total output, 65 per cent; death from anuria ten weeks after operation.

Chart II, Case 8. Time of appearance six and one-half minutes; total output, 77 per cent; death from anuria forty-eight hours after operation.

Chart II, Case 15. Time of appearance four and one-half minutes; total output, 46 per cent; death from anuria five days after operation.

These three cases are significant because of the following three facts: (1) All showed a uniformly good time of elimination; (2) All showed a good percentage of dye excreted; (3) All died of anuria. In the first case, however, quite a period of time elapsed between the original phthalein test and the fatal termination. During this time many factors might supervene which could in some way cause disorganization of the kidney function, with a resulting anuria.

Chart III.

In our previous paper we presented a chart of a series of comparison cases, in which we used phenolsulphonephthalein, indigo-carmine and phloridzin. We then decided to study phenolsulphonephthalein in connection with cryoscopy of the blood. In this study a series of twenty-three cases was under observation. The following three cases are the ones mentioned in Group II.

Chart III, Case 1. (Corresponding to Chart II, No. 1) The freezing point of the blood was —.58 at the time of operation. Ten weeks later he died of anuria.

Chart III, Case 6. (Corresponding to Chart II, No. 8.) At the time of operation the freezing point of the blood was —.74, and he died of anuria forty-eight hours after operation. Although the freezing point of the blood was unusually low, the phthalien figures were good, both as regards time of appearance, six and one-half minutes, and total output, 77 per cent. His general condition was good.

Chart III, Case 18. (Corresponding to Chart II, No. 15.) The freezing point was —.62 the elimination was 46 per cent, and the time of appearance of the dye four and one-half minutes. He died of anuria.

Case 1 had good figures both for phthalein and freezing point. Nevertheless, he developed anuria ten weeks later. Because of the complete immediate operative recovery and the uniformity of the figures, this case does not interest us as much as the other two cases. In both of these the phthalein figures were good operation figures, according to the present standard of acceptance of such figures, and we were therefore justified in assuming that these patients were good surgical risks, and in no immediate danger of post-operative anuria. The cryoscopic figures, on the other hand, at least according to the present more or less accepted arbitrary figures for cryoscopy, indicated that the patients were not ideal risks. The two tests contradicted each other.

Chart III, Case 7. (Corresponding to Chart I, No. 3.) First examination, time of appearance eight and one-half minutes; total output, 10.7; freezing point, —.58. Second examination, day prior to operation; time of appearance seventeen minutes; total output, 6.08 per cent; freezing point, —.64. Al-

though the phthalein test was uniformly low and the freezing point normal within ten days, the phthalein test was further diminished and the freezing point went down to —.64.

Chart IV.

This contains a few miscellaneous cases, all having a good time of elimination except No. 6, a paraplegia of long standing, in which the time was delayed to sixty minutes. In this case the amount of drug excreted was nine per cent. The rest of this series showed excretion varying from forty-seven to eighty-nine per cent.

CHART I.

KIDNEY CASES.

No.	Name.	Date.	Diagnosis.	Time of Appearance in Minutes.	Perentage Output of Drug.	Chemical and Micro. Findings.	Remarks.
1	N. K.	9/10/11	Renal calc. R. Ureteral calc. L.	4	50.	Albumen Pus Red blood corp.	Refused operation
2	Mrs. M.	10/ 4/11	Movable kidney	4	71.17	Negative	Ureters catheterized
3	R.	11/10/11	Chronic nephritis	R. 8 L. 9	3.705 7.06 10.765	Albumen Hy. casts Gran. casts Blood	Ureters catheterized first time Mixed urine second time Blood pressure, 115 Decapsulation
		11/20/11		17½	6.8	Pus	Death from anuria
4	C.	11/23/11	Chronic diffuse hephritis	R. 4½ L. 4	28.09 37.5 65.59	No casts Many red-blood cells	Both ureters catheterized Decapsulation and excision of piece for hist. exam. Uneventful recovery
5	Mrs. B.	11/29/11	Hydronephrosis Abscess of kidney (left)	R. 2 L. 4	34.69 22.41 57.10	Negative	Nephrectomy Uneventful recovery

CHART I—*Continued.*

No.	Name.	Date.	Diagnosis.	Time of Appearance in Minutes.	Percentage. Output of Drug.	Chemical and Micro. Findings.	Remarks.
6	S.	1/ 4/12	Pyleitis	5	R. 40. L. 36.49	Pus in urine from both kidneys	
					76.49		
			Tabes		R. 32.25		
		2/ 8/12	Dorsalis	3	L. 31.64		
					B. 4.24		
					68.18		
7	G. P.	1/6/12	Renal calc. L.	L. 9	10.04	R. B. C.	Left nephrectomy
			Ureteral calc. R.	R. 3	41.49	Few leucoc.	Right ureterolomy and removal of stone
					B. 6.86	No casts	Uneventful recovery
					58.39		
8	Mrs. K.	1/12/12	Ureteral calculi	R. 3	15.	Negative	Only 30 minutes' collection
				L. 3½	33.		
					48.		Only left ureter was catheterized
9	Mrs. T.	1/12/12	Pus kidney (left)	7	R. 20.83 B. 30.12	Pus in large amounts	Only right ureter catheterized
					50.95		
		1/30/12		R. 3	47.61		Both ureters catheterized
				L. 0	0.		No secretion from left catheter

10	Mrs. C.	1/30/12	Movable kidney Parametritis	R. L.	34.24 14.61 B. 20.12 68.97	Negative	
11	P	1/30/12	Renal calculus	8	48.5	Negative	Right-sided nephrectomy two years ago
12	M. G.	2/11/12	Pyonephrosis	2½	72.	Negative	Nephrectomy three years ago
13	Miss C.	2/14/12	Ureteral stone (left)	R. 4 L. 9	34.74 15.193 49.933	Negative	Double ureteral catheterization
14	Mrs. L.	2/15/12	R. Hydronephrosis L. ureteral obstruction	R. 1 L.	19.08	Negative	Thirty minute specimens Both ureters catheterized Left side color so weak it could not be read
15	Mrs. H.	2/23/12	Pyelitis of pregnancy	R. 7 L. 7	15.5 25. 40.5	Pus Bact.	Administered subcutaneously
16	Mrs. B.	2/25/12	Tubercular kidney (left)	R. 9 L. 9	15. 4.8 19.8	Pus	Administered subcutaneously Nephrectomy Uneventful recovery

CHART I—*Concluded.*

No.	Name.	Date.	Diagnosis.	Time of Appearance in Minutes.	Percentage Output of Drug.	Chemical and Micro. Findings.	Remarks.
17	S.	2/22/12	Pyelitis	L. 2½	13.13 B. 21.45 34.58	Pus	
18	L.	2/25/12	Nephritis	L. 3	20.83 R. and B. 41.49 62.32	Pus Casts Blood	

CHART II.

BLADDER AND PROSTATE CASES.

No.	Name.	Date.	Diagnosis.	Time. of Appearance in Minutes.	Percentage Output of Drug.	Chemical and Micro. Findings	Remarks.
1	M. McC.	9/ 7/11	Enlarged prostate	4½	64.93	Negative	Suprapubic prostatectomy Blood pressure 114 Death from anura ten weeks after operation
2	S.	9/10/11	Enlarged prostate	13	43.47	Albumen Pus Casts	Suprapubic prostatectomy Uneventful recovery
3	C.	9/20/11	Filroma of bladder	11	42.73	Pus	Suprapubic cystotomy and removal of tumor Uneventful convalescence
4		9/20/11	Enlarged prostate	4	48.78	Pus	Suprapubic prostatectomy Test made after operation
5	M.	9/18/11	Enlarged prostate	4	77.51	Pus	Suprapubic prostatectomy Phlebitis of pelvic veins
6	H. L.	10/ 2/11	Enlarged prostate	1	66.	Pus	Suprapubic prostatectomy Uneventful convalescence

CHART II.—*Concluded.*

No.	Name,	Date.	Diagnosis,	Time of Appearance in Minutes.	Percentage Output of Drug.	Chemical and Micro. Findings.	Remarks.
7	Capt. H.	10/ 3/11	Enlarged prostate	7	15.15	Negative	Suprapubic prostatectomy Secondary hæmorrhage Complete recovery
8	C.	10/10/11	Enlarged prostate	6½	76.92		Suprapubic prostatectomy Death from annuria in forty-eight hours
9	W. H. R.	10/12/11	Carcinoma of bladder	3	12.44	Pus Blood	Refused operation
10	J. D.	10/20/11	Carcinoma of prostate	2	59.645	Blood	Both ureters catheterized Refused operation
11	M. C.	11/21/11 11/28/11	Enlarged prostate	4½ 4½	55.24 66.8		Suprapubic prostatectomy Uneventful recovery
12	M.	12/30/11	Papilloma of bladder	4	91.74	Blood	Collected for two hours Suprapubic cystotomy Uneventful recovery
13	N. G.	1/ 3/12	Enlarged prostate, with calculi	3½	58.13	Blood Pus No casts	Suprapubic prostatectomy and removal of stone Uneventful convalescence

14	L.	1/13/12	Enlarged prostate, with calculi		49.01	Blood No casts	Suprapubic prostatectomy	
15	H.	1/30/12	Carcinoma of bladder	4½	46.29	Blood Pus Ammoniacal decomposition	Suprapubic cystotomy for drainage Death from anuria five days later	
16	A. B. S.	1/30/12	Carcinoma of bladder	17	43.44	Ammoniacal decomposition	Perineal section for drainage	
17	Mrs. W.		Vesical calculus	5	19.375	Pus Bacteria		
18	H.	1/20/12	Vesical calculus	2½	68.24	Pus	Litholapaxy	
19	McC.	2/21/12	Enlarged prostate	4	78.74	Pus	Suprapubic prostatectomy Uneventful recovery	

CHART III.

No.	Name.	Date.	Diagnosis.	Time of Appearance in Minutes.	Percentage of Drug Excreted.	Cryoscopy of Blood.	Remarks.
1	M. C. Mc.	9/ 7/11	Enlarged prostate	4½	64.93	.58	Death from anuria ten weeks after operation
2	S.	9/10/11	Enlarged prostate	13	43.47	.585	Suprapubic prostatectomy Uneventful recovery
3	L. A.	9/20/11	Enlarged prostate	4	48.78	.58	Suprapubic prostatectomy Uneventful recovery
4	H. L.	10/ 2/11	Enlarged prostate	1	66.	.57	Suprapubic prostatectomy Uneventful recovery
5	Capt. H.	10/ 3/11	Enlarged prostate	7	55.15	.56	Suprapubic prostatectomy
6	C.	10/26/11	Enlarged prostate	6½	76.92	.74	Suprapubic prostatectomy Death from anuria in forty-eight hours after operation
7	R.	11/10/11 11/20/11	Chronic nephritis	8½ 17½	10.765 6.8	.58 .64	Decapsulation — death from anuria Many hyaline and granular casts
8	M. C.	11/21/11	Enlarged prostate	4½	66.8	.59	Suprapubic prostatectomy Uneventful recovery
9	C.	11/23/11	Chronic nephritis	4	65.59	.56	Decapsulation
10	M. M.	12/30/11	Papilloma of bladder	4	91.74	.67	Suprapubic cystotomy Removal of tumor Uneventful recovery

11	L.	1/ 3/12	Sexual neurasthenia	2	84.71	.57	
12	N. G.	1/ 3/12	Enlarged prostate	3½	58.13	.58	Suprapubic prostatectomy Uneventful recovery
13	S.	1/ 4/12 1/30/12 2/ 8/12	Pyelitis Tabes	5 5 5	76.49 65.7 68.13	.65	
14	S.	1/13/12	Enlarged prostate		49.01	.60	
15	T.	1/30/12	Pyonephrosis	3	47.61	.57	
16	O'M.	1/30/12	Myelitis	6	76.49	.62	
17	J.	1/30/12	Amyotrophic Lateral sclerosis	6	81.3	.60	
18	H.	1/30/12	Carcinoma of bladder	4½	46.29	.62	Suprapubic cystotomy Death from urosepsis
19	A. B. S.	1/30/12	Carcinoma of bladder	17	43.44	.59	Perineal section for drainage
20	G. K.	2/13/12	Sexual neurasthenia	3	89.92	.57	
21	S.	2/13/12	Osteoma of spine Paraplegia	60	9.45	.59	
22	H.	2/19/12	Vesical calculi	2½	68.24	.57	
23	McC.	2/21/12	Enlarged prostate	4	78.74	.57	Suprapubic prostatectomy Uneventful recovery

CHART IV.

MISCELLANEOUS CASES.

No.	Name.	Date.	Diagnosis.	Time of Appearance in Minutes.	Percentage Output of Drug.	Chemical and Micro. Findings.	Remarks.
1	J. S.	9/26/11	Chronic urethritis	4	47.16	Negative	
2	L.	1/ 3/12	Sexual neurasthenia	2	84.71	Negative	Both ureters catheterized
3	O'M.	1/30/12	Myelitis	6	76.49	Negative	Painful and burning urination
4	J.	1/30/12	Amyotrophic lateral sclerosis	6	81.3	Negative	Retention of urine
5	G. K.	2/13/12	Sexual neurasthenia	3	89.92	Pus	Both ureters catheterized
6	S.	2/13/12	Osteoma of spine Paraplegia	60	9.45	Pus	Retention of urine

INTRAVENOUS ADMINISTRATION OF PHENOLSULPHONEPHTHALEIN FOR URETER CATHETER STUDY OF THE RENAL FUNCTION.

E. L. KEYES, JR., AND A. R. STEVENS,
NEW YORK.

Within the two years since Rountree and Geraghty published their first study of the advantages of phenolsulphonephthalein as a test for the functional activity of the kidneys, the number of contributions upon this subject, as well as the universal complimentary tone of these contributions, plainly shows that this artifical elimination has been better received than any of its predecessors. From theoretical as well as from practical considerations we may look forward to its taking a permanent place among our diagnostic resources.

Yet a great many points in our technic are still undeveloped, and it is toward the elucidation of one of these that this paper is devoted. Rountree and Geraghty propose the phenolsulphonephthalein test for three distinct conditions: —

(1) Kidneys with non-bacterial or "medical" nephritis.

(2) Kidneys suffering from bacterial or "surgical" nephritis.

(3) All cases studied by means of the ureter catheter.

These three conditions are entirely distinct, and the peculiar advantages in the use of phenolsulpho-

nephthalein for one of them, are not necessarily applicable to the others.

In the present paper, we shall confine our attention exclusively to the last point: the advantages and the technic of phenolsulphonephthalein injection in connection with the ureter catherization.

We have already published [1] a contribution to the general subject, and inasmuch as our special considerations naturally arise from a more intimate study of the opinions then expressed, we venture to quote the following words from that contribution as the basis of our present study. "In twelve out of fifteen ureter catheter examinations in which the data justified a comparison of the phenolsulphonephthalein output with the urea in cgm., these two indicators told the same tale and gave the same ratio of functional ability for the two kidneys, while the three cases in which they differed were better diagnosed by comparison of successive specimens obtained by ureter catheter than by any evidence derived from single specimens. Moreover, the study of successive specimens prevents errors from eccentricities of urinary excretion during the first period of ureter catheterization.

"We have found that in five out of eleven cases, ureter catheterism so diminished the output of phenolsulphonephthalein (proved by subsequent tests) as to render it most misleading in determining total kidney capacity; although, as we have already observed, the relative inefficiency of the diseased kidney, as compared with its mate, was correctly indicated by the test.

"Hence we deem it advisable usually to make two phenolsulphonephthalein tests, one with ureter catheterism, one without, just as one would make two

[1] American Journal of Urology, October, 1911, Vol. VII, p. 367.

urea tests, one with ureter catheterism, and one on a twenty-four hour specimen of urine. If the output of the drug is high during ureteral catheterization, clearly the second test is superfluous for estimating functional ability at this time.

"When the phenolsulphonephthalein test is employed with the ureter catheter only for the purpose of comparing the relative efficiency of the two kidneys, the patient's discomfort may be lessened, the possibility of error by extra-catheter flow diminished, and much time saved by collecting urines for successive brief periods, and comparing these with each other. As a general rule, for phenolsulphonephthalein, as for urea readings, twenty to thirty minute periods are preferable to shorter ones.

"The microscopic findings remain, as ever, the most important element in ureter catheter diagnosis. Urea and phenolsulphonephthalein estimations should confirm these, and successive specimens, for comparative readings, are unnecessary in the majority of cases, but are most helpful in the precise interpretation of ambiguous ones."

The three points in the above quotation upon which we would place especial insistence for our present purpose are: —

(1) The fact that the phenolsulphonephthalein test taken at the time of ureter catheterization is not an index of the absolute renal function, but only an index of the renal function at the time of ureter catheterization, of a renal function in other words, which may or may not be temporarily inhibited by fear, pain, or prostatic or urethral reflex.

(2) The fact that this inhibition is nevertheless usually bilateral, and therefore does not interfere with the comparison of the kidneys with each other at that time, or if one kidney is more inhibited than the other, this inhibition is due to disease in the

inhibited kidney, and consequently simply accentuates the importance of unilateral lesions, an accentuation which is likely to be rather advantageous than disadvantageous from the diagnostic point of view.

(3) The method of intramuscular injection employed by us up to October, 1911, required that ureter catheter specimens be collected for at least one, and often two periods, of from twenty to thirty minutes. Yet so marked may be the inhibition due to ureter catheterization, that in some instances very misleading results are obtained even after these long sessions.

Further observation during the past year enforces the first two conclusions. We have attempted, however, to cut down the inconveniently long period of ureter catheterization when the phenolsulphonephthalein was injected intramuscularly by substituting intravenous injection of this drug.

The suggestion to inject phenolsulphonephthalein into a vein, instead of a muscle, is not orginal with us, although this injection was used by us upon some of our first cases as long ago as October, 1910; while it is known to us that Dr. Schmidt uses intravenous injection in all cases.

But although placing the phenolsulphonephthalein directly within a vein eliminates the element of time of absorption, and expedites the output of the drug, we do not employ it in our estimation of the absolute renal function because of technical errors to which it is subject.

In the first place it is not easy to be sure (especially in the case of women) that the drug has been injected into the vein. Indeed we have had to reject two of our own cases because the little infiltrations appearing around the point of injection showed only too plainly that the drug had in part at least been injected subcutaneously. Yet both of us practice

the intravenous injection of salvarsan, which is a much more difficult procedure. If, therefore, we must allow for one such error in every ten or fifteen of the cases injected by us, how much greater would be the percentage of error in cases entrusted to others, notably to the members of one's house staff.

It may be objected that this error would be readily detected by the delay in appearance of the drug if injected subcutaneously, for under these circumstances it would not be likely to appear in the urine of a normal kidney in much less than ten minutes, whereas if injected intravenously it is likely to appear in less than five minutes. But apart from the fact that the abnormality of the kidneys is the very point in question, the difficulty is that the patient is likely to receive part of the injection inside of the vein, and part in the subcutaneous tissue. This results in an early appearance of the drug, as after intravenous injection, but a slow excretion, as after subcutaneous injection.

A second difficulty is incountered in the reading of specimens of urine obtained after intravenous injection. The greatest intensity of excretion is during the first fifteen to twenty minutes, and during that time a single cubic estimate may contain as much as four per cent of the drug, thus magnifying very much the possibility of error from carelessness in obtaining and handling specimens.

Moreover, the advantage of intravenous injection for general use is that it cuts down the time required for the examination from an hour or two to half an hour or so; an advantage of no particular moment in most instances. For ureter catheter work, however, this cutting down of time (in this instance from one-half hour or more, to fifteen minutes or more) is of the greatest importance not only for the convenience of the patient, but also for the accuracy of the test, since we all know that the longer the ureter catheter

remains in place the more likely is it to become occluded wholly or in part, thereby permitting extra-catheter flow, and vitiating the reading of the test.

Moved by these considerations we have employed the intravenous injection of phenolsulphonephthalein in connection with the ureter catheter diagnosis of twenty-eight cases. The results have been happy beyond our expectations. The accuracy of percentage readings was vitiated by extra-catheter leakage in only two cases (14, 23).

A study of the remaining twenty-six warrants the following conclusions: —

(1) The phenolsulphonephthalein output seems to be little if at all influenced by oliguria or polyuria. Thus the left kidney of Case 8 excreted seventeen and five tenths per cent in four c.c., an average of almost four and five tenths per cent per c.c., while in Case 6 the contents of a single ureter catheter (the left) yielded three and five tenths per cent phenolsulphonephthalein at the close of the examination. On the other hand the 100 c.c. excreted in the second fifteen minutes from the right kidney of Case 28 only contained nine and one tenth per cent of the drug.

(2) The phenolsulphonephthalein per cent agrees as closely as ever with the urea in centigrammes (urea per cent multiplied by c.c. of urine). This ratio was misleading only in Cases 3 and 12, in both of which the percentages of urea precluded the possibility of error.

(3) The "delay," *i. e.*, the interval between the injection of the drug and its appearance in the urine, varies widely. Thus in fourteen "normal" kidneys [1] the "delay" varied from two to nine minutes, averag-

[1] It is well known that the surgically sound fellow of a diseased kidney may be markedly inhibited in function. Yet it has seemed safer to adhere to the surgical rule and to dub those kidneys normal from which no pus or casts were obtained by ureter catheter

ing four and five tenths minutes. Yet among thirty-eight "diseased" kidneys no less than twenty-eight showed a delay within the "normal" limits and fourteen of them below the "normal" average, while in two cases (4, 15) the drug actually appeared in the urine of the diseased kidney, repectively one and two minutes, before it appeared from the sound one. In the former case, however, microscopic findings and per cent excreted excluded all possible error, while in Case 15 the left kidney, though showing a few pus cells, was probably acting fully as well as its fellow.

But the most striking feature of the "delay" is that it may be approximately equal for two kidneys whose function differs widely. This is exemplified in Cases 4, 5, and 26, and less strikingly in many of the others.

Hence the "delay" whether absolute or relative (as between the two kidneys) is peculiarly misleading and should be taken into consideration only for the purpose of estimating the time at which to begin collecting specimens for phenolsulphonephthalein estimation.[1]

(4) When employing intramuscular injection of phenolsulphonephthalein we several times were chagrined to find that kidneys which excreted high percentages of phenolsulphonephthalein without cystoscopy, excreted only traces of the drug during an hour when the ureters were catheterized. This inhibition has not occurred after intravenous injection.

(exception made for tumor, ptosis and hydronephrosis) and those abnormal from which these elements were obtained. Naturally our results show many "diseased" kidneys functionating more actively than certain "normal" ones.

[1] We have followed Geraghty's rule and made all estimations from the time of appearance in one kidney. This is necessary in order to make the readings simultaneous and not to invalidate urea comparison.

(5) Indeed so rapid is the output of phenolsulphonephthalein after intravenous injection that accurate readings can almost invariably be obtained in from ten to fifteen minutes after appearance of the color in the urine.

(6) Yet we feel that enough inhibition may result from cystoscopy to invalidate precise conclusions as to the normality or abnormality of the kidneys from the percentages of phenolsulphonephthalein excreted by ureter catheter even when intravenous injection is employed (*e. g.*, Cases 2, 13, 15). Roughly speaking, however, an excretion of one per cent or more per minute for the first ten or fifteen minutes is normal.

We append a brief summary of our results.

Normal Kidney.

Delay: 2′ to 9′ Average 4.5′ (14 cases).

Output: in 5′ 6.5 % (1 case).
in 10′ 9 to 18% (2 cases).
in 15′ 5 to 17.5% average 14.3% (10 cases).
in 20′ 17 to 47% (2 cases).
in 30′ 24.4 to 28.1% (2 cases).

Diseased Kidneys.

Delay: 2′ up Average 8′ + (38 kidneys).

Output: in 10′ 1.5 to 14.9% average 10% (10 kidneys).
in 15′ 0 to 17.5% average 7% (21 kidneys).
in 20′ 0 to 31% average 17% (12 kidneys).
in 30′ 0 to 19.7% average 9.6% (6 kidneys).

TABLE I.

UNILATERAL DISEASE.

Case No.	Age.	Diagnosis.	Time.	Right Kidney.				Left Kidney.				
				Delay.	c. c.	% P.	% V.	Delay.	c. c.	% P.	% V.	
1	28	The lungs and right kidney	20	30+	—	0	—	9	—	47	—	Lungs active Kidney quiescent
2	29	Left hydronephrosis	15	4	—	5	1.6	20+	—	0	0.8	
4	00	Right pyelonephritis	20	5	—	10	0.6	6	—	17	1.4	
6	35	Right renal colic	15	15	2	tr.	0.4	8	6	14.5	1.	
7	42	Normal	15	4	16	17	0.9	4	10	12.5	1.1	
9	36	Left ureter stone	15	3.5	29	16.5	0.4	10	7	tr.	tr.	
11	51	Left hypernephroma	5	3	3	6.5	2.1	8+	1	0	0.2	
13	41	Left ureter stone	10	2	8	9	1	2	13.5	7.5	0.4	
15	24	Left pyelitis	15	7	6	10	2	5	6	11.75	2	
16	35	Right ureter stone	15	?	2	tr.	0.8	5	—	17	1.2	
21	30	Left pyonephrosis	15	?	10.5	17.5	1.3	12	5	4	0.6	
22	34	Left renal colic	10	5	—	18	2.3	5	—	12	1	
26	40	Right hypernephroma *	15	4.5	8/2	7/2	0.6/–	4.5	12	16.4	0.7	Bladder not catheterized
			15	—	5/1.5	3.5/0.4	—	—	8	11.7	—	
27	27	Left calculous pyelonephritis	15	4.5	55	17.5	0.26	4.5	62	12.3	0.1	
			15	—	72	6.9	0.1	—	80	7.4	0.1	

* Double pelvis on the right side. Tumor attached to lower pole.

TABLE II.

BILATERAL DISEASE.

Case No.	Age.	Diagnosis.	Time.	Right Kidney.				Left Kidney.				
				Delay.	c. c.	% P.	% V.	Delay.	c. c.	% P.	% V.	
3	36	Bilateral pyelitis	20	8	25	10	0.3	8	45	10	0.3	
5	24	Bilateral stone; pyelitis	30	3	30	14	0.5	4	15	tr.	tr.	
8	23	Bilateral ptosis	15	6	13	9.5	0.4	6	4	17.5	1.8	
10	38	Bilateral pyelitis	15	3	—	11	1.0	3	—	16	1.1	
12	29	Bilateral tbc.	15	7	18	4	0.6	7	20	3	0.1	
14	26	Bilateral pyelitis	20	8	—	31	—	12	—	12	...	Bladder 14 % P.
17	30	Bilateral tbc.	10	23	—	1.5	0.4	?	—	2.5	0.6	
18	65	Bilateral pyelitis	15	6	8.5	11.5	0.6	6	8.5	10	0.8	
19	74	Bilateral pyelitis	15	4	—	12	0.3	?	—	7	0.4	
20	54	Bilateral pyelitis, prostatic	15	3.5	—	3	1.2	3.5	—	6	1.1	
23	52	Bilateral pyelonephritis	10	5	12	10	1.2	5	5	9.3	1.6	Bladder
			10	—	13	5.9	1.2	—	12	6.3	1.6	19/12.5/1.5
24	56	Bilateral pyelitis	10	3	8	8.9	0.5	3	8	11.9	0.6	
			10	—	10	6.5	0.5	—	11	6.5	0.55	
25	45	Bilateral pyelitis	10	3.5	11	14.3	0.4	3.5	8	9.9	0.3	
			10	—	10	7.2	0.5	—	9	7.3	0.55	
28	36	Left pyonephrosis	15	6	80	2.3	0.95		3	0	—	
		Right calculous pyeloneph.	15		100	9.1	0.20					

ALBUMEN DETERMINATION AS AN AID IN DIAGNOSIS OF KIDNEY LESIONS.

GEORGE W. WARREN,
NEW YORK.

In ordinary every-day work of diagnosticating kidney lesions the cystoscope is naturally used. But in a clinic as large as that of Dr. Swinburne at the Good Samaritan Dispensary a gross and, at the same time, a fairly accurate method must be used whereby these cases can be recognized. Symptoms are of little avail. Even if the patient is of fair mental ability it is impossible to obtain a history whereby the pathological lesion can be located even grossly. The reflexes between the bladder and kidney are so intimately associated that disease of one may produce symptoms referable to the other. For example, the marked bladder symptoms in cases of tuberculosis of the kidney even where the bladder shows no macroscopic lesions are well known. A case of acute inflammation of the prostate with stranguay and frequency may simulate stone in the bladder. A patient with pyelonephritis came under my observation. He had been treated with bladder irrigations for a year. At operation six stones were removed from right kidney. In this case all symptoms were referable to the bladder.

All genito-urinary surgeons have had cases with pain in the right side in whom diagnosis of appendicitis had been made only to find the cause of pain to be stone in the kidney or ureter. What is easier

than to test the urine for albumen (during one of these attacks of pain) and if present to examine the urine for microscopic blood?

In pyuria it is most important to know from what portion of the urinary tract the pus enters the urine. Here there are many possibilities and at times unusual conditions. The pus may originate from any part of the tract. It may, however, enter the urinary stream from some point outside the tract — as in a case observed some time ago. A cripple complained that his urine became cloudy when he lay upon his left side. Upon examination the cloudiness was found to be due to pus which entered the bladder through a sinus communicating with an abscess of an old right hip disease.

In considering cases of kidney lesions from a surgical standpoint they may be divided into those of infection, those harboring a foreign body, or those of new growth. The first group, that of infection, is the most important, as cases of pyuria are *most common.*

Since the time of Bright albumen has been associated, in the minds of physicians, with lesions of the kidney. But apparently in kidney surgery little use has been made of this fact. As a rule all cases of suspected kidney involvement are cystoscoped at once.

Of all the albumens found in urine we are interested for practical purposes only in the serum albumen which is coaguable by heat and is indistinguishable from the albumen found in the blood plasma. Nucleo-albumen, serum globulins, albumoses or Bence Jones bodies are of great interest, but rarely demand attention, being more functional than anatomical.

The many so-called causes of albuminuria will, in my opinion, as time goes on, all be explained by changes in the parenchyma of the kidney or by the

presence of blood in the urine, pus exerting very little influence in this regard. As pointed out above, the albumen is probably the same in both cases,—one entering the urine by means of a lesion of the vascular system, the other through changed parenchyma.

In cases of doubtful kidney lesion where the urine is clear (that is, in medical cases) or with a urine slightly turbid from blood, manifestly the albumen output is of little surgical diagnostic value. Thus, in cases of uninfected stone or new growth of the kidney the albumen is of little diagnostic aid.

But cases of kidney infection is where the albumen content plays the important rôle. It may be argued at once that as albumen is due to changes in the kidney parenchyma, why should albumen be present in cases of pyelitis? Here the same argument holds, as in all kidney lesions there is no pure type. Pure pyelitis never exists. No one holds to a pure interstitial nephritis. If the infection of a kidney is due, as a rule, to back pressure of the urinary stream, or to the presence of a foreign body, and is, in the majority of cases, hematogenous, how can the pelvis without the parenchyma be infected?

All authorities who have given serious attention to this question agree that the ratio of albumen content to the amount of pus in the urine is the most important criterion in differential diagnosis. In cases of cystitis where the pus sediment is several centimeters high the albumen content is never more than one tenth to fifteen hundredths per cent. On the other hand if this pus is derived from an infected kidney an amount of pus sediment in the urine only one or two millimeters high will give an albumen content of from one tenth to fifteen hundredths and more per cent.

Thus in cases of kidney infection where the amount of pus is minute the albumen content is always

greater than in cases of infection of the bladder, no matter how much pus there may be in the latter. This fact holds only in urine free from blood.

The following table taken from Dr. Henry T. Brooks' book on "Clinical Microscopy" schematically expresses the ratio of albumen to pus.

	No infection of kidney. Albumen. (Percentage.)	Kidney infected. Albumen. (Percentage.)
I. Maxium degree — Numerous pus cells in liter glass.	0.1	0.3
II. Moderate degree — Pus sediment about ½ centimeter high.	0.06	0.2
III. Slight degree — Pus sediment 1 to 2 milimeters high.	Just distinctly recognizable.	0.1
IV. Minimum degree — Recognizable almost only by microscope.	Not recognizable.	Distinctly recognizable.

This table is only approximate and is of no value where blood is present in the urine. Determinations made by Esbach.

Exceptions may be taken by some to this hard and fast rule; for example, in cases of profuse purulent urethral discharge. The urine in these cases shows a high albumen content, but here, as in all acute inflammatory exudates, there is a large amount of blood, which is easily recognizable under the microscope. Many similar examples can be mentioned.

In this differential diagnostic work it is of the greatest importance to examine the urine catheterized from the bladder, thus as a rule excluding the pus originating in the prostate and urethra. There are cases where the pus may flow back from an

infected prostate through the muscle of Bell and thus enter the bladder urine. In most of these cases there is a urethral discharge which will guard against error.

In our work where urine contains pus of doubtful origin only the urine catheterized from the bladder is examined as a routine. The importance of this is well shown in the following case: A patient suffered for three years with attacks of recurrent intermittant pyuria. They followed excessive activity, began with a chill followed by high fever. During the attacks, which lasted about a week, he was confined in bed. The urine voided during one of these periods was free from blood, but contained a large amount of pus. The albumen content was over two tenths per cent. A diagnosis of kidney infection was made and cystoscopic examination advised. On introduction of the cystoscope only clear urine was drawn. Aside from congestion of the prostatic area the bladder appeared to be normal. The urine drawn from the left kidney contained casts, albumen, etc., typical of an old nephritis. The urine from the right kidney was normal. Prostatic secretion obtained by massage was filled with pus — thus the case was easily explained. The pus had entered the urine from the prostate, the albumen from an old diffuse nephritis of the left kidney.

Cases of suspected kidney infection where the urine from the bladder contains pus and the albumen content is too low to explain a kidney infection are met with. For example: A patient forty-two years of age had had pus in his urine since an attack of typhoid two years ago. Catheterized urine was free from blood, but contained a large amount of pus; albumen content very low (a minute trace with nitric acid).

Cystoscopic Examination. Bladder walls normal in appearance, blood vessels easily seen, trigona slightly congested. Two golf holed opening symmetrically placed in the region of the ureters were seen. Catheters were introduced their full length into each opening. Urine containing a large amount of pus flowed in steady drops from each catheter, which gave the impression that the kidney pelvis had been catheterized. Kidney infection could not be explained with such a low albumen content. A large amount of pus with a very low albumen content pointed only to a bladder infection.

Skyograph taken with a metal stillet placed in one of these openings showed it coiled upon itself. At a later examination normal ureters with normal urine were located just about the golf holed openings. This easily explained the urinary findings. The golf holed openings were the entrance to the congenital diverticula which had been infected at the time of typhoid — and, as is known, diverticula are rarely ever freed from an infection.

To summarize: The albumen content in its relation to the amount of pus in the urine is the greatest gross aid in diagnosticating kidney infections.

The albumen content in the most marked cases of cystitis does not exceed fifteen hundredths per cent. Therefore, in pyuria of doubtful origin where the urine *is free from blood* an albumen content of more than fifteen hundredths per cent in the great majority of cases indicates that the kidney is involved. With a small amount of pus and an albumen content of fifteen hundredths per cent it can safely be assumed that the kidney is infected.

DISCUSSION

OF PAPERS OF DRS. SCHMIDT, KEYES AND WARREN.

DR. JOHN T. GERAGHTY of Baltimore: I think possibly a few words may not be amiss as regards the limitations of functional tests and as to what we may expect from them.

The function of the kidney as determined by any of the present-day methods is nothing more than the function of the kidneys at the time the test is made. It does not tell you the nature of the disease, what may happen tomorrow, or what combination of circumstances may occur which may change entirely that function. It is impossible to predict what combination of circumstances may arise which may change entirely the function, and it is impossible to predict in what way any certain thing which you may do will change the function of the kidney on the succeeding day. You cannot separate the renal function from the function of other organs. No test will ever be ideal until it gives us not only the function of the kidney, but that of every other organ which has any influence whatsoever upon the kidney. In heart disease in which there is chronic passive congestion of the kidneys, the renal function may drop to a very low point and with disappearance of the congestion return again to normal.

A few words with regard to the different methods of administration. Absorption necessarily plays a rôle. Consequently we find that the subcutaneous method gives a variation. The intra-muscular gives less. Following the intravenous injection absorption plays no rôle at all. On our normal cases the excretion is directly in proportion to the concentration of the drug in the blood. In diseased conditions, however, we have another factor, the impermeability and the slowness of the kidneys to respond to the new stimulus. For that reason, short observations have an error. The kidneys are slow to take up this new work, and you must give them sufficient time to do the maximum amount of work. For that reason and because we have not been able to determine the relation between concentration and stimulus, we are holding to the intra-muscular method for total functional estimations. When employing the test in conjunction with ureteral catheterization the intravenous injection of phthalein is as a rule to be preferred. We collect usually for two

fifteen-minute intervals. The diseased kidney will vary little in its work — the more diseased the less it will vary.

With regard to the part of the kidney which has to do with the excretion of phthalein, we have been able to determine that the renal tubules alone excrete phthalein and the glomeruli little if at all.

DR. HUGH CABOT of Boston: We have continued to use this test since I last reported upon it, and I confess that to me it has lost none of its advantages. We have seen the same type of variation that has been referred to by Dr. Schmidt, and we do not believe now, any more than we believed in the first place, that supreme and complete dependence upon that or any other test is safe. We have successfully operated upon patients whose output was limited to the merest trace; and, exactly on the opposite side, we have lost patients, as has Dr. Schmidt, whose output was thoroughly good; but we were not surprised with the results in either of those two classes of cases. We operated upon the cases with a very low output, knowing that we were taking a very large risk, but also knowing that, excepting for their renal function, they were in good condition. The patients that we lost were patients with a good renal function and with good kidneys, but with extensive and necessarily fatal conditions in other organs, demanding operation in an attempt to save life.

We have used the intravenous method, as has Dr. Keyes, in order to save time in catheter cases, and we have not been impressed as apparently he was by the possibility of error in its injection. I do not remember but one case in which leakage outside the vein occurred, and I think it would rarely be overlooked by those who are familiar with the use of salvarsan. It certainly saves time and I do not believe that the error introduced is larger than by the intramuscular method, and it seems to me that the saving of time is of very real importance.

The two fifteen-minute intervals which Dr. Geraghty refers to have been the same as we have used, and we have believed that it gave us about the same evidence of the kidney's work as did the hour by the intramuscular method. It seems to me very valuable.

I am glad to hear Dr. Geraghty bring out the necessary limitations in this test and of all functional tests of the kidney, that patients will not necessarily live or die wholly upon the kidney function, but that we, particularly in this specialty, cannot stand squarely upon our feet unless we know in every

case what the kidney function is. Our main difficulty has been that while we had a very sound knowledge of other organs, we had a very shaky knowledge of the function of the kidney.

DR. S. WILLIAM SCHAPIRA of New York: In a paper read before this association at Atlantic City in 1909 on "The Functional Activities of the Kidneys," I pointed out the fallacy of estimating the functional activity of the kidneys by the percentage or quantity excreted by the kidneys of any one substance introduced into the human body from without. I shall not repeat the reasons at this time, but shall say that the same holds good as to the phenolsulphonephthalein test, as shown by a series of tests conducted by me in company with Drs. R. H. Greene and Furniss at the City Hospital. Twelve cases were subjected to this test. Five of these cases were true kidney patients, the other patients had normal kidneys. One week later eight of these patients were again submitted to this test, and the following was observed: —

(1) The color appeared in the urine in patients with normal kidneys in between eight and ten minutes; in pathological kidneys the color appeared in longer time after injection.

(2) The quantity of the phenolsulphonephthalein excreted in the first hour varied from twenty-two per cent in normal kidneys to thirty-six per cent in bad chronic interstitial nephritis.

(3) At the two different sittings the result of the tests was neither constant, nor the same.

(4) The color in one case at the first sitting did not appear in the urine after two hours' observation, while at the second sitting a week later, the color appeared in forty-five minutes after injection.

From these observations, I can state that the phenolsulphonephthalein behaves exactly as the other dye tests, as indigocarmine, methylene blue, etc., and is in no way more realiable.

The same series of cases were subjected, at the two different sittings, to the phloridzin test and gave prompt, correct and constant results.

DR. HENRY L. SANFORD of Cleveland, Ohio: We have been using this test in Cleveland and have found that it gives us very valuable information. We follow the technique very closely of Drs. Geraghty, Schmidt, and Cabot. We have used the intravenous method in the ureter catheter cases, and our experience has been that the amount of drug excreted in one-half hour with the intravenous method corresponds very closely to

the amount excreted in one hour with the intra-muscular method. There have been some cases where the results have been difficult to interpret, but, as Dr. Cabot says, probably the results after operation must have been due to some influence outside the kidney. We had one case of diabetes with hypertrophy of the prostate, where the kidney function was apparently perfectly good, and the bad result after operation was probably due to the diabetes. I think that is a very important point, that there are other organs to be considered beside the kidney. We feel, however, that the test has been of very real importance to us, and we have a great deal of faith in it.

DR. GEORGE K. SWINBURNE of New York: I had hoped that Dr. Warren's paper would bring out some discussion. The point was entirely new to me when he brought it to my attention, and it certainly has been a very valuable one in our work at the Good Samaritan Dispensary. We always examine the urine for albumen and exclude the presence of blood and reckon up the amount of pus.

Some cases in which we have used the phenolsulphonephthalein test, curiously enough have shown a small percentage of output, where the renal function, however, seemed fair; and yet these cases, though the output of the drug was so small that I was rather doubtful of the outcome of the operation, as a matter of fact, made a very rapid recovery and their renal function seemed to be perfectly good. I think the point brought out by Dr. Cabot and Dr. Geraghty about the function of other organs is a very important one.

DR. BRANSFORD LEWIS of St. Louis: I have noticed one point that seems to me of considerable importance in the use of this phthalein test. Possibly I do not place the absolute reliance that may perhaps be placed on it when we study it further, but I believe it is serviceable in giving us a line on changes in the activity of kidney secretion, and I have used it with satisfaction in this light. By it I have observed definite improvement in renal elimination under the influence of treatment. One week the first hour would produce twenty per cent return of phthalein, and the second hour a corresponding proportion, perhaps less, and then after using stimulative treatment, washing out the system with water, and maybe digitalis, we would get thirty per cent or more.

DR. E. E. SMITH of New York: In connection with the paper of Dr. Warren, I have been in the habit of making obser-

vations upon the quantity of albumen and make use of those results in connection with the location of suppurative lesions. In the first place, as to the method of estimating the albumen: I regret that there is nothing practical in the way of a more exact method of estimating the albumen than the one made use of in much of our work, the Esbach method. I might call attention to the fact that at first the Esbach tube was made of a definite height, not of a definite content. As time passed it came to be thought that the Esbach tube should be of a definite content, and if the tube is larger or smaller in caliber, the lines are pushed up or down, so that at the present time the tubes represent nothing more than the mode of standardization of the individual maker.

The method which I employ in my work, and which is applicable to all men with laboratories because it is relatively simple, is to use an amount of urine that contains approximately ten mg. of albumen, to coagulate that after the addition of salt and acetic acid by heat in the usual way, to filter it off on a perforated filter with a layer of asbestos on it by the aid of suction, to wash it with six washings of hot water, followed by alcohol and ether, to dry in an oven at one hundred and ten degrees, to weigh, ignite and weigh again. Those who have the equipment of an ordinary laboratory will find this procedure simple. That is the routine method I have employed, therefore my results as to quantities may differ from Dr. Warren's because of the different method employed. I have found that the greatest possibility of mistake has come between a prostatic abscess and a pyelitis; in other words, we are apt to find with the pus from the prostate more albumen than we will get with a cystitis. Of course, those of you who are doing clinical work will very readily distinguish between the location of those two lesions by the ordinary examinations, but I do call attention to the necessity of such distinction. Where the amount of albumen is less than .05 per cent by weight I think the diagnosis is doubtful. Where the amount of albumen is over .05 per cent by weight, if the amount of pus is only small or moderate, I feel that I can safely locate the lesion as occurring in the kidney after we have ruled out the possibility of a prostatic abscess, eliminating also, of course, the presence of free blood.

DR. MARTIN W. WARE of New York: I wish to speak on the papers with reference to phenolsulphonephthalein. The question we have to ask ourselves is, What was the need for this test? What was the demand that called forth the

supplying of this particular test? I think if we go back we will find that the need was to ascertain if we possibly could whether one kidney was functionating sufficiently well to permit an operation upon the other. I had hoped the speakers would tell us to what extent that test had influenced them favorably or adversely towards extirpating a kidney. Some years ago when Casper put forward his phloridzin test — and up to this day he is the strongest champion of it — he stated that he was able to reduce the mortality following nephrectomies to five per cent. I should like to know how this mortality has been affected in the experience of those who have used the phthalein test. All these other facts are purely technical, and even the champion of the test himself, Dr. Geraghty, tells us that you have to take into consideration all the functions of other organs. That is the crux of all functional tests. This is a substance that is foreign to the body. We do not have to excrete it every day in the week. It may be closely allied to other substances which the kidneys do excrete, but it is still a foreign substance. It is not absolutely reliable because you have to take into consideration other things. If a reduced mortality can be traced to reliance upon any of these functional tests, we shall be in an advanced position. But that is not so. Antedating the claims of Kümmel and Casper, Dr. Bangs and Dr. Tilden Brown of this city attained a low mortality before any of the functional tests were known. They operated on selected cases. They used their judgment as to whether one kidney was or was not seriously affected, and they had a mortality which can be shown to be equal to that of Casper. So until the gentlemen can show us that the mortality has been reduced by the use of this test I do not think we can consider the efficacy of the test as proven.

DR. GUY L. HUNNER of Baltimore: I wish to say just a word in relation to Dr. Warren's paper. On the whole I quite agree with his conclusions, and still I feel that we have to use the same judgment if we are depending upon the relationship of the amount of albumen in helping us settle the question whether we are dealing with a bladder or a kidney lesion, the same sort of judgment that we use in the phthalein test. If I understood Dr. Warren correctly, he made the statement that there is no such thing as a pure pyelitis. I judge that he inferred that the kidney parenchyma is always involved when there is an involvement of the pelvis of the kidney. That is the particular feature of his paper that I wish to take exception to. I think it would be rather dangerous teaching to have that idea go unchallenged

in a meeting of this sort. If that statement holds true and we are depending upon the presence of albumen or the amount of albumen in the urine to tell us whether we have a kidney lesion, we certainly will overlook a number of pyelitis cases, and there are at the present time too many pyelitis cases being overlooked. I firmly believe that there are many cases of pure pyelitis. You see cases in which a catheterized specimen from the bladder shows no albumen and no other evidence of parenchyma lesion. Even in a catheterzied specimen from the kidney, if you do not get blood cells — usually you do get them and a slight amount of albumen — but occasionally you can catheterize and not have blood cells or albumen and still that specimen will contain pus cells and bacteria, showing that there is a pyelitis present. As I say, those are the class of cases that may go for months at a time without any serious trouble, and then suddenly have a rise of temperature, chills and every evidence of kidney infection. I have seen several of those cases that have gone about, one of them as long as four years, from physician to physician, and because their symptoms were mostly those of cystitis they had had all kinds of drugs poured into them from above and washings of the bladder and so on, everything aimed at a supposed cystitis, when a few lavages of the kidney did away with a condition that had been present for years. I simply wish to warn against taking that statement without these exceptions.

DR. LOUIS HEITZMANN of New York: I have had no experience whatever, personally, with the different functional tests, but I have learned considerable from the discussion this afternoon, and what I have learned has simply strengthened my belief in these different tests; that is, that up to the present time we still have no functional test upon which we can rely. Whether it is the test that has been spoken of in two papers this afternoon, or one of the other tests, every one seems to be open to some objection or other, and I must ask the question, Why is it that at present not more time is devoted to the microscopic examination of the urine taken separately from the two kidneys? If we do this carefully, gentlemen, we can learn infinitely more as to the condition of our patients than we can from purely functional tests.

I want to say a word or two in regard to Dr. Warren's paper. There is really nothing more important than the question as to the amount of albumen, and as to whether we can tell from this alone if the kidney is affected or not. The doctor is certainly correct when he says that in most cases the amount of albumen

in kidney lesions is more than the amount of albumen in lesions from the bladder or from the prostate or any other part of the genito-urinary tract. But the Doctor does not seem to have taken into consideration that we have severe kidney lesions where there is either only a trace or a faint trace of albumen, where at times no albumen whatever is found, with all the more rapid tests at our disposal; I allude to cirrhosis of the kidney, hobnail kidney. Every pathologist who has made a number of autopsies will agree that there are intense lesions of the kidney which have caused death and which have not been diagnosed during life, since little or no albumen had ever been found in the urine, and microscopical examination did not reveal the presence of casts.

The gentleman who spoke just before me mentioned another question that Dr. Warren has brought up, that is, Dr. Warren claims that pyelitis does not exist without a nephritis. I too would like to take exception and pronounced exception to that statement. It is perfectly true that when we have a hematogenic infection of the kidney the pelvis becomes involved secondarily, and we have both the kidney substance and the pelvis involved. But there are cases, and these cases are not at all rare, where there is not originally a hematogenic infection of the kidney, but where there is an ascending infection from below upwards. Then we may have first a prostatitis, subsequently a cystitis, ureteritis and a pyelitis, and the inflammation need not for a long time go beyond the pelvis of the kidney. If there is an intense infection of the kidney pelvis, lasting for some time, surely sooner or later the kidney substance will be and is bound to be involved. Again, there are instances of primary pyelitis due to stone, the so-called pyelitis calculosa, where at first there is no renal involvement whatever. Sooner or later, it is true, congestion of the kidney takes place and even an inflammation, but pyelitis without nephritis is by no means rare.

DR. GERAGHTY: I think Dr. Ware has missed the real point as regards the value of functional tests. They are not always used to determine whether we can do a nephrectomy or not. They are used in my experience three times out of four for diagnosis. When you have a bilateral lesion and wish to know the procedure to follow it certainly is an extremely important thing to know the functional capacity of the kidneys so as to be able to select the proper line of treatment. Again, in hematuria, we wish to know whether it is due to hypernephroma, whether it is an essential hematuria, or whether it is due to

nephritis. In those cases by using this test you will get a great deal of information which will be of value. In chronic nephritis you will have equal function, but decreased total function. If the lesion is unilateral from a hypernephroma or a tumor you will have decreased function on the diseased side. Again, you are not always able to catheterize both kidneys, especially in tuberculosis. What are you going to do about the other kidney unless you do an exploratory operation? You cannot tell the condition of the opposite kidney unless you have some means of estimating its function.

DR. GUSTAVE KOLISCHER of Chicago: I have no personal experience in the phthalein test, because I do not believe any more in functional tests that are based on the creation of an arbitrary standard for the renal functions. I would like to call attention to some of the logical mistakes and weaknesses in the arguments of men who advocate this method. Dr. Cabot stated that if the patient died after a favorable report from the phthalein test we had to take other things into consideration. If everything runs along smoothly the test is fine; if the patient dies it was not the fault of the test; something else was wrong.

That functional tests should enable us to make a diagnosis of a tumor of the kidney or of a unilateral tuberculosis of the kidney is very mysterious to me. A beginning hypernephroma still encapsulated does not influence the function of the kidney at all.

As to the possibility of making a differential diagnosis between pyelitis, cystitis and nephritis by sizing up the quantity of albumen, I think that the differentiation between seroalbumen and nucleoalbumen ought to give more reliable information.

DR. CABOT: It may be that I failed to make myself clear to this Association as to what I meant. If I did, I apologize. But Dr. Kolischer has not in the least reproduced what I said or the impression which I intended to convey. No one believes more than I do that a thorough study should be made of every case, and I stated clearly that in those cases in which the kidney function was good and the patient died, we knew beforehand that there were probably fatal lesions in other organs, but the kidney function being good, we believed ourselves justified in taking the risk. Dr. Kolischer would take us back to the utter chaos of the time when we paid no attention to the kidney function. There may be possibilities of error in the estimation of the kidney function, but the mere fact that any given method

is open to certain objections does not in the least bring us to the conclusion that we should discard that and all methods. It is our business to take up these methods and study them with care, and when one method has less shortcomings than its predecessor, it takes its place. I do not suppose the originators believed this test to be the last word of God, but I believe it is superior to any other functional test heretofore brought to our notice, and it therefore deserves our respect.

DR. KOLISCHER: I do not mean that Dr. Cabot does not study his cases. I called attention to the danger of logical reasoning, adapted to the occasion. I forgot to mention one point which cleans up all theoretical talk. The first man who fought this erroneous idea of functional tests was Rovsing. He proved that he was right in dismissing these tests. No man has got better results than he has. He is one of the few reliable men. What he says is so. If such practical results are obtained by a man who objects to the usual functional tests, there must be something yet that we do not know. A man can have excellent results without these so-called functional tests. Consequently they are, to say the least, unnecessary.

DR. WARE: Although I have not used this test as faithfully as some of the others, I am of the opinion of the previous speaker. He has stated that Rovsing, amongst others, is one of those whose mortalities are far below those of Casper when he was using all of the tests.

I feel very well repaid for having listened to this discussion, because I have certainly learned something; for instance, that one is in a position with phthalein to diagnosticate tuberculosis and hypernephroma. That is news to me. I thought you diagnosed tuberculosis by the finding of the tubercle bacillus, and if you do not find it the first time I would advise you to examine three or four times and to see if someone else cannot find it, before you take out the kidney on the evidence of the phthalein test or any other test that is employed. We have for a long time been doing functional tests. The gentlemen who say we have not are perhaps fighting shy of the issue. We have been estimating the urea. That is an organic metabolic product excreted as the result of the action of the kidney or the liver. Yet we have all availed ourselves of the urea test, and I warrant you that most of the gentlemen find a report insufficient that comes from the laboratory if it does not have something to say as to the amount of urea. If the urea is deficient and the

phenolsulphonephthalein shows the function is adequate, I warrant you they had rather stick to the urea test than to the phthalein test.

DR. WARREN in closing: With reference to Dr. Smith's argument about the determination of albumen by the Esbach tube, after you have done several of these Esbachs you get rather a definite idea of how much albumen you are going to have by the cold nitric acid test. You must remember that albumen in the kidney does not run higher than three-tenths of one per cent. The Esbach tube only accounts for seven-tenths of one per cent. In regard to prostatic abscess, I use a rubber catheter. That eliminates pus from the prostate.

Dr. Geraghty spoke of tuberculosis of the kidney. Suppose he drew urine from the bladder and found more albumen than could be accounted for by the pus present. He knows the parenchyma of the kidney is changed. Dr. Heitzmann spoke of the intersitial type of nephritis. I am not speaking of medical cases.

Dr. Hunner spoke of pure pyelitis. A few years ago people spoke of a pure interstitial nephritis. The albumen that is excreted is not nucleo-albumen, but serum albumen. If there is blood in the specimen, that throws out your determination.

DR. SCHMIDT in closing: I wish to thank all those who have taken part in the discussion. I think there is a misunderstanding on the part of some. There are those who do not believe in the functional tests. It does not mean that those of us who are interested in this line of work are particular admirers of any of the different functional tests, but that we are simply trying to establish — at least that is my desire, to try to bring up some functional test that is better than its predecessors. We all know perfectly well their shortcomings; but with these shortcomings being eliminated from time to time, it is possible that we will be able to arrive at some definite conclusions so that we can tell the exact value of this particular test. I do not believe, neither does any one else, that any one single test can ever prove the functional activity of the kidneys; but with the additional clinical information and experience in connection with this particular test, I am inclined to believe we will be able to come to some conclusions in the future far more accurately than without the use of this test.

TWO CASES OF DIVERTICULUM OF THE BLADDER TREATED BY OPERATION.

ARTHUR L. CHUTE,
BOSTON, MASS.

Within the past two years I have had an opportunity to operate upon two bladder diverticula that I feel belong to the same general type. A study of these cases brought out several points that have been of interest to me.

The first patient was a man thirty-four who had suffered from several attacks of gonorrhœa, the first about twelve years before. Following his genorrhœa he developed a tight stricture of the deep urethra, which, however, had been fully dilated at the time I first saw him in the spring of 1910. This patient had a very turbid urine that was slightly foul. It contained pus in moderate amount and myriads of colon bacilli. Besides bladder washings, he had been given a long and thorough treatment with vaccines, but without appreciable result. It was found that his bladder contained five and one-half ounces of residual urine. His reflexes were normal.

A cystoscopic examination showed an opening just to the outside of his left ureter that was about the size of an ordinary lead pencil. It had the characteristic appearance of the opening of a diverticulum. Both ureters were catheterized and gave a good amount of normal urine. A radiograph with a styletted catheter coiled in the diverticulum gave a rough idea of its size and position.

This man had little frequency and only occassionally slight pain in urination. As he was much concerned about his long-continued turbid urine, and as I felt that the turbid residual was a menace to his kidneys, operation was decided upon.

October 5, 1910, an incision was made through his left rectus, from just above the pubes to a point well up toward the umbilicus. Previous to operation the bladder was washed thoroughly. A catheter was passed well up the left ureter, and another ureter catheter coiled up in the diverticulum with the idea that it would help to define its boundaries. A retention catheter was passed into the bladder and the bladder distended with air. The abdominal incision was carried down to the perivesical space just above the symphysis and the peritoneum peeled back from the bladder. This separation of the peritoneum was quite extensive, being carried well to the right of the median line behind. A mass was found to the left of the bladder which was about the size of a large egg. It was covered with a layer of fat that was denser than that covering the bladder. This mass was gradually dissected free everywhere but below. Above, certain muscular fibres ran from the bladder wall, but were soon lost on the surface of the diverticulum. I was unable to identify the opening of the diverticulum into the bladder, as the ureter catheter I had coiled in it had slipped out. I therefore opened the diverticulum and with the opening in the bladder located, was able to dissect it free below, so that I had a sac with a small neck at the point of communication with the bladder. The base of the diverticulum was at least an inch lower than the opening into the bladder, and apparently somewhat lower than the floor of the bladder itself. The neck was tied, the sac cut and the bladder wall brought together

with catgut in two layers over the stump. The catheter in the left ureter was of the greatest help in placing the sutures. The ureter was so near that it was only by the greatest care that injury or compression was avoided. I do not believe it would have been possible without the ureter catheter to show its exact position. Tube drainage was carried down to the bottom of the perivesical space on the left and a rubber wick placed in the space behind. The wound was closed in layers about the tube and wick. A retention catheter was left in the bladder. There was considerable suppuration in the perivesical space, and it was five weeks before the wound was solidly healed. It would have been wiser, I believe, to have drained the perivesical space from below.

This patient was seen from time to time following operation, and he usually showed a small amount of turbid residual, though for a short time immediately after operation he emptied his bladder completely. Cystoscopic examination showed the wall smooth at the point where the opening had been. As his small residual of turbid urine persisted, and as there was a place where the tip of a sound caught at the entrance of his bladder, I removed in the Fall of 1911, with a Young's urethral punch, a little piece of the bar at his bladder outlet. When last seen, March 9, 1912, this man had a transparent urine containing a few fine shreds.

In spite of my dread of allowing a patient to go on with a considerable amount of infected residual, I felt at times that perhaps I had subjected this patient to an unjustifiably severe operation, considering that he was having practically no subjective symptoms; any misgivings that I had on this score were, however, dispelled by my second case, which illustrates what I believe is simply a more advanced stage of the same condition.

This patient was a man fifty-nine years old. I did a perineal prostatectomy for him in 1908, removing rather small lateral lobes and a pedunculated intravesical obstruction as large as a small olive. The latter had acted as a ball valve, and he had been absolutely dependent upon a catheter for some time previous to operation. After operation he passed urine voluntarily, but I found that he had, on several occasions, a residual of from 7 to 12 ounces. This I attributed to an atonic bladder that I expected would in time regain its contractility. At the time of operation his urine was purulent, of low gravity, albuminous and low in solids,—the picture of a pyelonephritis. I hoped that the relief of his back pressure would better his renal condition.

Following operation this man was very comfortable for two and a half years. He then had an attack of acute cystitis with a very foul urine. He was found to have a residual of eight ounces. Cystoscopy showed what I took to be an intravesical projection on his left, near his bladder outlet; my notes stated that I could find no hypertrophied muscle bundles or trabeculation. I found the explanation of this later. When a moderate amount, only, of fluid was injected into his bladder, it simply filled the diverticulum. This crowded the bladder forward so that the entrance to the diverticulum was immediately behind the internal meatus, and my cystoscope went directly into it. The mass I saw on the left was a part of the septum between the bladder and diverticulum.

Believing I had to do with an intravesical mass that I had overlooked at the previous operation, I opened his bladder suprapubically in July, 1910. There was no mass, but low down on his right I found a circular opening that would admit the tip of my forefinger. This opened into a considerable

cavity, the floor of which looked wholly different from the bladder surface. Instead of being red and velvety, it was smooth and pearly white. I dilated the opening, put a tube into the cavity and brought the end out through the suprapubic incision. The suprapubic wound closed slowly. In October, 1910, this man was free from subjective symptoms, but showed a slightly turbid residual of nine and one-half ounces, for which he was advised to use a catheter once a day.

In December, 1910, he had a recurrence of his bladder distress, also gastric symptoms, which, with his low gravity urine, low in solids, suggested renal insufficiency. His frequency gradually increased until on one occasion he had to get up seventeen times during the night to urinate. He was not successful with the use of a catheter, though it could sometimes be passed directly into his diverticulum. On these occasions it went in ten inches and drained a large amount of slime and crystalline detritus. On one occasion a soft rubber catheter, inserted through the urethra, was tied into the diverticulum for a few days with great relief, but it could not be retained.

The last of February, 1911, it was decided to attempt the removal of his diverticulum. An incision was made through the right rectus just above the pubes and carried upward. The peritoneum was gradually separated from the bladder and then from the upper surface of the diverticulum; in doing this, it was torn through twice. When the diverticulum was exposed, it was found that it was very large and that it partially undermined the bladder. The right ureter opened into the diverticulum, and not into the bladder. There was only a suggestion of a few muscle bundles running from the bladder out onto the surface of the diverticulum. The man's condition was such as to make it seem improbable that he

could bear the excision of the diverticulum and transplantation of the ureter. The incision was therefore closed. For several days following operation his condition was critical; he had vomiting, hiccough, distention and a very scanty urine.

As we had accomplished nothing in the way of bettering his condition, I reopened his incision two weeks later, cutting part way across the right rectus. The bladder was opened on its right side, and with a thermo-cautery I made three radiating incisions in the circular septum that separated the bladder and diverticulum. This enlarged considerably the opening between the cavities. The wound closed slowly. When last seen, in July, 1911, he had been able, by the use of his catheter and irrigations, to keep his urine much clearer. He had little in the way of discomfort referred to his bladder.

The general subject of diverticulum of the bladder has been considered relatively recently in papers by Young, Von Eberts, Fischer and others, and I shall not consider the subject in general, but only the type presented by these two cases. This type, I believe, differs essentially from the clearly congenital double bladders, on the one hand, and also from the little herniæ of the bladder that are directly due to pressure and usually arise near the vertex.

Diverticula, such as those in the reported cases, in my opinion, cannot strictly be called congenital, yet I believe they always have their origin in the little pits that one sees from time to time just to the outside of the ureteric orifice, and which are undoubtedly faults or anomalies in the development of the bladder. I have seen these pits on a number of occasions. Usually they have been unilateral, but a man whom I had under my care about a year ago showed little openings on both sides which would admit a ureter catheter for about a quarter of an inch.

I have been unable to find a definite explanation for these little openings, but, arising as they do so near the ureter, it seems probable that they must represent anomalies in its early development. Embryologically, buds from the fœtal ureter, which might easily lead to such little pockets, are supposed only to arise to the inner side of the ureter, while these are seen on the outer side.

Many writers note the frequency with which diverticula appear just outside the ureter, but I have seen no explanation offered for this. I believe the most probable explanation lies in these little congenital pits or pockets which probably represent some anomaly in the very early development of the ureter. These little pockets are not confined to males. Within a short time I saw one in a woman. The presence of one of these little pockets is not in itself sufficient to bring about the formation of a diverticulum; it simply predisposes. There must be the determining agent as well, which is an increase of the intravesical pressure. This may be due to obstruction at the bladder outlet, or anywhere along the urethra, or I believe that a sharp cystitis, attended with violent bladder spasm, may be sufficient.

Given the congenital defect in the bladder wall, which, judging from the one case I have investigated, goes pretty well through the muscular layer, and we have determined the point where there will be a hernial protrusion if the intravesical tension is raised beyond a certain point. Once the protrusion has begun, the process will be progressive because of the lack of contractility of the wall of the diverticulum.

In certain other respects too, these diverticula situated near the ureteric orifice deserve special consideration. They present dangers that do not apply to those that are differently situated.

With the increase in size of such diverticula there is a tendency for the bladder surface near the diverticulum to be everted or drawn into it, and to carry with it the opening of the ureter. This, I believe, must always be attended sooner or later with pyelonephritis on the side involved, and eventually with very serious crippling, if not destruction, of that kidney. If there is not this pulling of the ureteric orifice into the diverticulum, the pressure of the enlarging diverticulum against the ureter will interfere with drainage and predispose to ascending infection. As these diverticula increase in size, they tend at times to burrow toward the bladder outlet and by pressure to interfere mechanically with its ability to empty iteslf. The more the bladder has to work to empty itself the greater will be the pressure in the diverticulum and the faster it will increase in size. I do not know that this type of diverticulum shows any particular susceptibility to the formation of calculi or to malignant degeneration.

Usually these deeply placed diverticula will not present symptoms until such time as they are infected, but, with a certain amount of stagnant urine, infection is bound to come sooner or later. Then even, the symptoms will not often be distinctive, but will be those of bladder infection in general. The finding of any considerable amount of residual urine in a young man, and a considerable number of these cases have appeared in the thirties, will be highly suggestive. The actual diagnosis will usually be made by cystoscopy and the recognition of a characteristic round opening just outside a ureter. A graphic method of showing the approximate size of a diverticulum of this sort is by means of a radiograph after one has coiled a styletted ureter catheter in the diverticulum. This method, I believe, was first shown by Brown and Osgood. Filling the diverticulum with

collargol is said to give good resuts, though I have not used it. Once a diagnosis of this condition has been made, I believe one can advise nothing but the excision of the diverticulum, if the patient's condition will warrant it. Palliation by means of the catheter has not usually been a success.

Fischer in his article says the mortality in forty-eight cases collected from the literature was sixty-six and seven tenths per cent. He simply states that some of these cases were treated by means of operation and some without it. In six cases, however, that were treated by primary or secondary resection, he states all recovered and were well.

Von Eberts collected eleven cases of excision of diverticula: of these eight were cured, two had fistulæ at the time they were reported, one died. He rightly says that "the age at which these cases occur imposes a grave responsibility upon the surgeon," for, as stated above, many of these are in young men.

We have two general methods of excision. Young has reported successes by working from inside the bladder. Von Eberts operated successfully by a combined method. He approached the diverticulum by the extraperitoneal route and separated it extraperitoneally, but was guided in his dissection by a finger introduced into the diverticulum through a suprapubic incision. I cannot help feeling that the extraperitoneal operation, when it can be carried out, is the more surgical procedure. When this method is adopted, a catheter should be put in the ureter on the affected side to serve as a protection against injury to the ureter when closing the opening in the bladder wall.

Young has devised a very ingenious flap operation to allow him to replace the ureter in the bladder, without resection and transplantation, when it has been dragged down into the diverticulum. It was suc-

cessful in the case in which he used it, but I should suppose it would hardly be practicable if there was much displacement of the ureteric orifice into the diverticulum.

When the ureter cannot be brought into the bladder by Young's manœuvre, it will be necesssary to resect it and reimplant it in the bladder. If one can be sure there is a good kidney on the well side, and is in doubt as to the condition of the one opening into the diverticulum, I believe the preliminary removal of the kidney on the side of the diverticulum should be considered and would probably be a conservative measure. With a ureter opening into a diverticulum it will probably rarely be possible to get the urine directly from that side by means of catheterizing that ureter. However, it should be possible to occlude the well ureter sufficiently to get a pretty accurate idea of the value of the kidney on the diseased side.

Both Young and Von Eberts employed drainage of the perivesical space by means of a tube brought out through the perineum. They both, however, state that they believe this is not necessary. I did not employ drainage through the perineum, and had a considerable suppuration in the perivesical tissue. I believe that perineal drainage is a wise precaution, considering that there will almost invariably be some infection and the great disadvantage of "up-hill" drainage in such a place.

In cases in which, like my second, it seems improbable that a patient can withstand so severe an operation as the excision of one of the deep-lying diverticula is bound to be, our only recourse is to make the opening between the bladder and diverticulum as free as possible. This can be done by cutting the septum with scissors or a thermo-cautery through a suprapubic wound. It is merely palliative.

I would especially call attention to the probable

cause of this sort of diverticulum: the little defects in the bladder wall near the ureteric orifices; also to the importance of recognizing these diverticula early and excising them before the neighboring ureter has been drawn into the sac, or the sac has become of such size as to make its excision unnecessarily difficult.

Bibliography.

Young: The Operative Treatment of Vesical Diverticula with Report of Four Cases. Johns Hopkins Hospital Reports, 1906. Vol. 13, p. 401.

Von Eberts: The Surgical Treatment of Non-resilient Diverticula of the Bladder. Annals of Surgery, 1909, Vol. 50, p. 883.

Fischer: Congenital Diverticula of the Bladder. Surgery, Gynæcology and Obstetrics, 1910, Vol. 10, p. 156.

VESICAL NEOPLASMS.

J. F. McCARTHY,
NEW YORK.

The subject-matter of this paper will include such morbid outgrowths as have their origin in the urinary bladder, and as the time allotted is, under the circumstances, necessarily short, only the briefest possible resumé, together with some conclusions with relation to treatment, may therefore be presented. The author will quote freely from a previous communication (Tumors of the Bladder, by Dr. John F. Erdmann and Dr. J. F. McCarthy), which article thoroughly covered the work performed and observations conducted prior to that time.

Etiology. According to Caspar, specific diseases are not considered a causative factor. Calculi are doubtful, and while catarrhal cystitis may lead to proliferation of the vesical mucosa so that tumor-like outgrowths resembling villi occur, they microscopically, however, differ from true papillomata. Much doubt has been expressed as to the provocative action of irritating substances. The close observer, however, cannot fail to be impressed with the weight of evidence in its favor — as for example, the observations of Goebel at Alexandria, where the marked frequency of vesical outgrowth in the presence of the eggs of the bilharzia led him to question the effect of other irritations in this connection; and the conclusions also of Rehn, who insists on the relative frequency of these growths in workers in

dye-stuff, as anilin, fuchsin and toluidin. It is probably a coincidence, but the writer has failed to find a single "water drinker" in any of the cases coming under his observation, and it may be just possible that faulty metabolism, such as long-continued urinary hyperconcentration, plays an important etiological rôle. At any rate the suggestion is not remiss that there be accorded closer observation and more widespread publication to this phase of the subject, particular attention being paid to the crystalline content.

Pathological Anatomy. The microscopic aspect will not be taken up in this paper.

First, situation. According to Albarran, the trigon solely is rarely the seat of papillomatous invasion, this author having seen but one case in which it was involved alone. The consensus of opinion is that in the very great majority of cases the lower zone constitutes the chief seat of attack, the favorite site being behind and to the outer side of either ureteral orifice. Such growths as a rule, however, do not involve the ureteral mouth. Fenwick states that the trigon is in fact the only enclosed space in the bladder incapable of originating villous papillomata. Its density of structure may have something to do with this.

The anterior wall is rarely invaded. The writer has noted this in three of the twenty cases coming under his observation. In six cases multiple growths were found, eight being clinically benign while twelve were malignant.

Cystoscopically, with few exceptions, beyond ascertaining the exact situation, the extent of the pedicle, the size and general physical characteristic of the growth, one should not go, least of all in the majority of cases should one attempt anything more than a tentative diagnosis, inasmuch as pedunculation is

by no means a definite indication of benignancy (Albarran reports twenty-eight pedunculated growths, thirteen benign and fifteen malignant), and not infrequently do pedunculations present themselves as outriders of a malignant base.

Nor should much dependence be placed on the microscopic examinations of small fragments spontaneously expelled, while frozen sections at the time of operations are not infrequently misleading, and the fact that an induration of the pedicle at its site of implantation may be the result of an hypertrophy of the connective tissue element of a benign growth rather than an indication of malignancy, serves to accentuate an already complex situation.

Symptomatology and Diagnosis. It is classical to describe the symptomatology as follows: An idiopathic, intermittent hematuria, usually total; rarely, when the growth is located in the region of the vesical neck, the blood will be more pronounced at the end of urination. This hematuria is capricious, entirely independent of external causes such as obtain in vesical calculi; in fact, it frequently is more marked when the patient is resting quietly in bed, disappearing and reappearing without discernable cause.

In a case of multiple growths (four) coming under the writer's observation the hematuria invariably was more marked after playing tennis; while in another patient with two growths, one of which was situated in the region of the vesical neck, a ball-valve effect was noted, the flow suddenly shutting off in the midst of the urinary act, which could only be completed by a change of position.

Thompson has called attention to dysuria as an indication of malignancy. This contention has been refuted by others and regarded as merely an indication of cystitis. The writer, however, is convinced that the combination of dysuria, urgency, frequency

and hematuria, in the presence of a sessile or an infiltrating growth, associated with bullous œdema, is absolutely pathognomonic of malignancy. Rectal or vaginal bimanual examinations should never be omitted in these cases.

Cystoscopic examination may, in cases of suspected malignancy, be supplemented by a stone searcher exploration, with a view of determining the degree of infiltration at the point of departure of the growth, though this, in view of the danger of hemorrhage, should by no means be regarded as a routine procedure.

Treatment. So great a stimulus has been given this important branch of the subject by the work of Beer and Keyes, and at the same time so much confusion has ensued as a consequence, that much still remains to be said and done before even the liberal-minded surgeons have oriented themselves sufficiently to map out a definite plan of action suitable in the majority of cases.

Intravesical operative procedure was first placed on a substantial basis by that pioneer of cystoscopy, Nitze, whose claims were, to say the least, startling. He stated as follows: "This cauterization is relatively simple and its effect is more than superficial. I have treated one hundred and fifty bladder tumors with only one death. Ages thirty-two to seventy-nine. In all but three of these cases a cure was had. By that I mean all had practically absolutely clear urine, and only very occasionally, at all events less frequently than following sectio-alta, did one find a small residue which was at once destroyed."

The writer is under the impression that most of these cases have had recurrences. Nitze employed the cautery through a water medium, the hemorrhage controlled by means of ergotin, styptisin, calcium lactate and creolin. (The last two in the writer's hand have been most effective.)

Luys employed the galvano-cautery through his direct aspirating endoscope with, as he claimed, exceedingly satisfactory results.

In this country Beer and Keyes, followed by a number of their contemporaries, have within the past two or three years inaugurated the method of destruction of these growths by means of the Oudin spark generated from the Wappler high-frequency machine, and with results in a great majority of cases that have been most gratifying. The writer's experience in seven cases treated with the Oudin spark has been of a similar character. Two of these cases were recurrent following operation; the first, three years after, and the second, five years. One of these cases showed four distinct pedunculated growths situated about the site of suprapubic incision, together with a chain of similar growths located just behind and above the vesical orifice. The growth on the vault could only be approached by projecting the wire well into the field and with the other hand on the abdomen rolling the various parts of the bladder wall into the picture; the contact being made with the foot switch, which the writer was first to employ in conjunction with this work. It is really surprising how distinctly the various parts of the vault may in this manner be brought into view.

Another case, worthy of note here, occurred in a woman of sixty with a very large sessile growth occupying the right half of the floor and lateral wall of the bladder, completely obscuring the ureteral orifice on that side. She was examined by three of the most competent men in this city, two of whom regarded her growth as an infiltrating carcinoma. The third gentleman stated that in the light of recent experience he would consider the case a benign one. The writer remained on the fence and informed the patient — an unusually intelligent one, by the way, —

that the growth might very well be malignant and might equally well be benign. She was treated at the writer's hands by means of the monopolar (Oudin) spark, and at present, some six months since the cessation of treatment, the patient is cystoscopically and symptomatically free of all vestage of growth. The ureteral mouth is plainly visible, there being no evidence of scar formation whatever.

In but one of these seven cases, a man seventy years old, are there any symptoms. This patient has a very marked intravesical enlargement of the prostate, but his only complaint is moderate increase in frequency and hazy urine.

As to the efficiency of the procedure in properly selected cases there should no longer exist the slighest doubt. Nor should the procedure be regarded as a palliative one, as it is at least as radical as the suprapubic removal by coning the mucosa, and should prove much more effective and of greater permanency because of its thoroughness. Inasmuch as no growth, however small, should escape the expert cystoscopist, these buds may and frequently do escape inspection through the suprapubic route. The cystoscopic procedure in addition does not expose the patient to the danger of recurrence along the site of bladder incision, as may be the case in cystotomy.

The technique of its application is a matter of individual opinion. The writer prefers a number of sittings rather than two or three intense applications. During such treatments the operator has the end of the wire under complete control and makes the contact at various points of the growth, and with a clear field no danger need be feared. As a general rule a week will in most cases constitute the interval between operations. The destructive action of the spark should extend to the sub-mucous layer, which is the probable site of departure of the papillomatous growth.

A point worthy of note in the application of the treatment is the following. If the operator after a number of apparently effective sparkings observes that the condition of his patient remains stationary he should discontinue all treatment for from four to six weeks. On the next examination the surgeon may find his patient absolutely well, as has been the happy experience of the writer in two cases.

It would appear that the current has its most effective field of application in small or moderate sized growths — single or multiple — that are accessible, and in the light of recent knowledge at least appear benign. On the other hand, the author believes that prolonged use of this method in the absence of favorable results is a faulty procedure; as such cases require more radical intervention. It is also worthy of note that the Oudin spark has proven effective in arresting hemorrhage in cases of inoperable tumor of the bladder.

As to the mode of approach in surgical intervention there appears to exist also a wide divergence of opinion, and the writer may as a consequence be pardoned if he presents some impressions gleaned as the result of much thought and considerable experience. These views are advanced chiefly for the purpose of self-enlightenment as well as to promote free discussion.

First. In the extraperitoneal route the procedure of filling an infected bladder with fluid and discharging its contents over the operative field has always impressed me as illogical and unsurgical, and it is my belief that air dilation should be employed or the liquid evacuated through the catheter before opening the organ. If this be true it naturally follows that puncturing the wall with a needle traction suture or the act of grasping the bladder with sharp tooth instruments is faulty. It would seem advisable,

then, to sieze the wall with non-penetrating clamps, and with the bladder distended deflect or decorticate, as the case may be, the peritoneum to the extent desired.

Second. In line with this thought is the free flushing of the cavity in terminating the operation. This may and should be dispensed with in favor of the application of gauze wipes taken from very hot water and applied directly to the part by means of a sponge holder.

Third. Much care should be exercised in avoiding the extension of the incision downward in the direction of the pubovesical attachment, as at this point proper closure is difficult and it constitutes a frequent cause for prolonged healing and fistulæ.

Fourth. For patent reasons the bladder should be kept as dry as possible during the operation. This may be achieved by means of ureteral catheterization when it can be conducted, or by the use of an electric aspirator.

Fifth. Perfect illumination of the interior of the bladder has been more frequently desired than accomplished. The writer trusts the little tantalum illuminator with a bird-cage attachment which prevents soiling, may, to some extent, eliminate this difficulty.

Sixth. In the choice of material and the placing of sutures upon closure one should exercise considerable care, as the presence of suture material in the bladder cavity constitutes a potential factor in subsequent calculous formation. In a case seen recently in consultation, in which a transportional removal had been done, cystoscopic examination revealed the presence of a suture in the bladder some six months after the operation.

In the opinion of the writer the extraperitoneal route is sufficient in the great majority of cases.

Where, however, extensive resection of the bladder is deemed necessary, the transperitoneal route may be followed. This method of approach, however, is not likely to come into widespread use, inasmuch as it adds to the gravity of the operation, for which it does not afford sufficient compensation.

In the previous communication, mentioned above, the author called attention to the fact that this operation was first performed by Rydigier in 1885 and published in the Wiener Medicinische Wochenschrift as Deliberate Laparo-Cystectomy.

Finally there appears to exist some misunderstanding as to the lymphatics in the bladder, which may be quickly cleared up upon reference to the comprehensive work on the subject by Pasteau. It is his opinion that lymphatics in the mucosa remain to be demonstrated, but a distinct system has been shown to exist in the submucous, muscular and subperitoneal layers. He emphasizes also the relatively great frequency of iliac and pelvac nodes following infiltrating vesical growths.

About two years ago the writer encountered a case showing a large sessile growth of cauliflower type, situated about and completely obscuring the right ureteral orifice. A well marked bullous œdema coexisted with this and the case was undoubtedly a malignant one. The usual suprapubic incision was made, the growth seized with a Guyon pedicle clamp and cauterized to its base with an actual cautery. Upon releasing the clamp a well defined gush of urine spurted from the middle of the charred surface, showing clearly that the ureter mouth was included in the clamp. No trouble was anticipated from this, as Albarran's experience has shown that so long as room is allowed for the escape of urine into the bladder the condition usually adjusts itself.

The patient progressed uneventfully until five

months ago, when the hematuria returned and the symptom complex of malignancy as previously described.

Cystoscopic examination showed two large lobulated masses just inside the vesical orifice, evidently outgrowths from the prostate and almost completely blocking the outlet. Behind the mass on the right side there appeared another growth similar in character and situation (cauliflower) to the one removed eighteen months before. The case was not regarded as an operable one, and in view of the comparatively superficial effect of the Oudin (monopolar) spark, unsuited for it.

Some investigation of the subject in conjunction with Mr. Rhinold Wappler demonstrated to my entire satisfaction the deep-seated action of the bi-polar (or D'Arsonval) spark, and in a tentative fashion this was applied by means of the cystoscope — a metallic pole being placed under the buttocks, the wire introduced through the instrument constituting the other.

After five months the patient has gained about fifteen pounds in weight. Diurnal frequence, every three to four hours, with complete absence of nocturnal micturition. Urine clear, no microscopic blood, the patient remaining symtom free.

In conjunction with Dr. Squier copper electrodes have been constructed for use through the usual suprapubic incision and growths removed or cauterized as with the galvano cautery knife, the D'Arsonval spark being the one employed. While the work at this moment is in too immature a state to render a detailed report, sufficient has been accomplished to demonstrate the remarkably distinctive action of the current on growths of proven malignancy.

In the writer's opinion the following conclusions, in the light of recent advances, would appear to serve as a more or less adequate working basis, though in reality each case should be considered on its individual merits.

First, That the Oudin spark treatment (cystoscopic) applies to small or moderate size growths, single or multiple — particularly the latter, which are accessible and apparently of a benign character.

Second, That in the absence of a reasonably prompt effect such treatment should not be prolonged.

Third, That except in the unusual case where pronounced hematuria obscures the view, the method will supplant the suprapubic operation of coning the mucosa.

Fourth, That the application of the spark should not be made in a cloudy field, as in such event it is inexact and dangerous.

Fifth, That growths of an infiltrating character and suspiciously malignant should very promptly be removed by resection through the entire bladder wall at least two c.m. beyond the mass, and when in close proximity to the ureteral orifice should include ureter transplantation.

Sixth, In the case of a very great number of outgrowths in the bladder which, while benign, are from their very multiplicity, not amenable to the spark treatment, one should not forget that this same treatment may be directed with much effectiveness via the suprapubic opening.

Seventh, It is the author's fond hope that the employment of the D'Arsonval spark may offer something even of a palliative nature to such cases as at the moment of this writing would appear to be beyond our reach.

DISCUSSION

OF PAPERS OF DRS. CHUTE AND McCARTHY.

DR. HUGH H. YOUNG of Baltimore: The paper on diverticula has interested me very greatly, and Dr. Chute deserves the thanks of this Association for bringing up this subject, which has been very much neglected. I think the question of the treatment of diverticula of the bladder is very far from settled. It is true that the great majority of cases do not require operation, but then we do find cases which should be operated, and which often present very difficult surgical problems. Where you get them at the vertex of the bladder or on the anterior wall operation is generally easy. I have had three cases in which a diverticulum was in the region of the urachus. One of these patients had a diagnosis of appendicitis, examination revealing a diverticulum that periodically would become stopped up. Another case, a baby, had a large abscess of a diverticulum above the bladder, evidently a urachal diverticulum. Another case seen recently came in the hospital with a large, hard, but not tender mass suprapubically. A diagnosis of sarcoma of the bladder was made. The cystoscope showed a peculiar granular adenomatous appearance of the membrane which we thought an infiltration due to sarcoma. The case was thought to be inoperable, but an exploratory operation was suggested. The patient refused this, and suddenly one day the entire thing disappeared, and the patient is now entirely well and the abdomen is perfectly soft.

The other points of predilection are in the region of the ureteral orifices, as he points out, three points being where the urachus joins the bladder wall, leaving a point of least resistance where they go through.

As to operative treatment, it seems to me a great deal depends on what has happened to the ureter. It is certainly true that you may frequently have large diverticula which have produced no compression upon the ureter; on the other hand, you find cases occasionally where, unless you do something the kidney will surely be destroyed. As brought out by Dr. Chute, not infrequently we may have the orifice in the diverticulum; in fact, I have watched cases from year to year where the ureteral orifice was gradually pulled into the diverticulum. In one of my cases to which he referred, the patient had a large diverticulum, and

by introducing the cystoscope through the opening the ureteral orifice was found inside. The diverticulum was extremely large, extending up back of the bladder along the rectum, very closely adherent to the pelvic wall, so that I believe it would have been impossible to remove it without incision into the bladder, as suggested by Dr. Chute. Another reason was that the patient had a diverticulum on the left posterior wall which made it necessary to have an intravesical opening. In that case the sac was surrounded with adhesions to the rectum and to the lateral wall of the pelvis, and when we came to the region of the ureter the question was, what could be done to bring the ureter into the bladder without excising and transplanting it. This was accomplished by preserving a portion of the innermost wall of the diverticulum in the shape of a flap which included the ureter. This was loosened, drawn up into the wound, and sutured to the edges of the orifice from which the diverticulum had been excised. This patient is, I think, still living, eight years afterwards, and has not had any trouble with his kidneys. This plastic procedure is, I believe, far preferable to division and transplantation of the ureter, and can be easily carried out in almost all such cases. Where the diverticulum is not surrounded by many adhesions it is an easy matter to reach in and catch it with forceps and evert it just as you would a finger cot.

One case I had was very interesting, that of a man who had a diverticulum on the posterior wall of the bladder, which diverticulum contained a large carcinoma. In that case it was necessary for me to go right through the bladder wall into the peritoneal cavity and excise the diverticulum, with the carcinoma. It was very easy to do, and I think if you have to attack intraperitoneal diverticula, instead of going intra-peritoneally first, there is no reason why you should not make the incision around the diverticular orifice and go into the peritoneum from the bladder. It gives you a chance to see just how much should be done around the orifice of the diverticulum.

One of the great questions is what to do with multiple diverticula, particularly those with stones. I have recently had one distressing case with recurrent calculi, returning shortly after I had removed them, where the diverticula were so numerous that in order to cure them you would have had to remove the posterior wall of the bladder. It seems to me they represent a very serious class of cases that are extremely hard to handle. In those cases I have found that enlarging the diverticular orifice was not sufficient for a cure. The calculi generally recur, and,

as I say, the patients suffer very greatly. The whole question of the treatment of diverticula is one of which there is very small literature, and deserves free discussion. Certainly a great many do not require any treatment at all. Where there is obstruction, an enlarged prostate or a prostatic bar, or, as occurred in two of my cases, congenital valves in the urethra, removal of these obstructions will usually make urination so free that the diverticulum causes no harm.

DR. MARTIN W. WARE of New York: I think from a review of the recent contributions on the subject of diverticula of the bladder that it is a rather frequent affection, and I hope that the discussion here today will throw light on the proper method of procedure.

I wish to present a very interesting case. The patient was a man, thirty-seven years of age, who had been perfectly well except for a gonorrhœa in his youth. He had been married some fifteen years or more. He presented himself complaining of hematuria, pyuria and painful urination. He had always been able to void properly. Cystoscopy revealed a large diverticulum. I operated along the lines laid down by Dr. Young. I could not see the other ureter. I got into the bladder and was able to pass a ureter catheter on the opposite side. I split the diverticulum up for considerable distance. Below the diverticulum I found a septic mass from which fluid was escaping. The suprapubic fistula closed, but absolute retention followed. Finally he became desperate and submitted to another operation. I now did a transperitoneal operation, with the patient in a high Trendelenberg position. I came immediately upon this pouch, and found a double ureter entering into this diverticulum. The diverticulum was removed and the ureters transplanted into the groin. The patient made a good recovery, and was able to void after having had retention for a year, but his urine is still purulent and he has residual urine. A few days ago a calculus was removed.

DR. GUSTAVE KOLISCHER of Chicago: As to diverticula of the bladder, I most heartily thank Dr. Chute for recommending the extra-peritoneal route. As to their demonstration, I think the best way is by filling the bladder with collargol solution, and then take an X-ray picture. In the female quite often a diverticulum is diagnosed by the inexperienced when there is nothing but a distortion of the bladder due to adhesions.

Dr. Young takes a conservative standpoint. He operates

only when there is a distinct indication. As to the choice between the intra-peritoneal and the trans-peritoneal route, that cannot be decided in a general way.

As to tumors of the bladder, I think Dr. McCarthy touched upon one of the most important subjects in our specialty, and at the same time the weakest point in bladder surgery. As to the differential diagnosis I should like to get some information. He said it is impossible to make by cystoscopic examination a differential diagnosis between benign and malignant cases. Later on he informs us that the burning with the spark in properly selected cases will give good results. I am convinced that in certain cases we are almost certain we can make a diagnosis. If the tumor's epithelial covering is intact, if the tumor is transparent, and if the pedicle is thin and constricted it is certainly benign. Whether cauterization with the spark is better than cauterization with the galvano-cautery, remains to be seen.

As to special technique, I should like to take issue with him. He said that the filling of the bladder with fluid previous to a suprapubic incision was non-surgical. I would like to disclaim that. I think I can prove it. It is very well known that if we inoculate the most virulent germs into a soil and carry along at the same time some antiseptic solution, their growth will be suppressed entirely, or at least be considerably interfered with. Now if we open a bladder which is only distended with air some germs may enter the spaces that we open, without any restriction as to their development. The doctor claims that it is very important not to flush out the bladder, but to wipe it dry with gauze. I most seriously object to that. The one thing that we are always afraid of in tumors is unnecessary traumatism, because we know that very often in this way the neoplastic cells are inoculated into the traumatised parts. If we use gauze we traumatise the epithelium and deprive the mucosa of its protection.

I indorse again what the doctor said about the extra-peritoneal in preference to the trans-peritoneal operation. It is proven that in most cases we can extirpate the whole of the bladder outside of the peritoneal cavity. In cases where the growth involves the peritoneal covering of the bladder it is necessary to open the peritoneal cavity.

As to illumination of the bladder during operations. It has been tried before. Dittel used to bring a cystoscope into the bladder through the wound. Nitze constructed a retractor that carried a lamp. All these things are unnecessary if we make a sufficiently large incision. With a good incision and a

proper retractor the whole interior of the bladder is exposed to view.

As to the use of ureteral catheters, it is rather interesting to me to hear that Dr. Chute claims that the introduction of the catheters into the ureters was so helpful to him. Beginning in 1888 when we began to systematically catheterize the ureters we thought that would prevent accidental ligation of the ureters, in hysterectomies, for instance. We found, however, that it did not prevent it at all. There is only one way to prevent accidental ligation of the ureters, and that is to expose them.

DR. CHUTE: I was very much interested in Dr. Young's operation, but I cannot see how he is able, working from within the bladder as he does, to bring the muscular layers of the bladder well together, as accurately or firmly as one can working outside the bladder.

I should suppose any inaccuracy in bringing the muscular layers together would predispose to a hernial protrusion of the mucosa and the reformation of a diverticulum.

Distending the bladder with air I think helps to define the limits of the diverticulum and makes its separation from the surrounding tissues easier. Also the presence of a ureter catheter in the ureter of the side nearest the diverticulum allows one to place his sutures in such a way as not to distort the ureter or interfere with its function. Both these points apply especially to the extravesical operation.

DR. MCCARTHY: Dr. Kolischer asks about differential diagnosis by means of the cystoscope. The writer intended to convey the impression that in the vast majority of cases cystoscopic diagnosis was a relatively impossible procedure, but he also stated in the paper that the symptom-complex of urgency, frequency, tenesmus, and hematuria, in conjunction with a sessile or infiltrating growth, was almost pathognemonic of malignancy, and he spoke of malignancy in just such a case.

In so far as cauterization with the galvano-cautery and the electric spark is concerned, I think to those of us who have used the electric spark that there can be no comparison, that the electric spark is altogether better, more easily done, with less danger, and may be conducted in relatively unskilled hands.

In so far as the employment of antiseptics is concerned, my reading of the bacteriologists' report on the employment of various antiseptic solutions and the relatively short time of contact of antiseptics, such as the Doctor mentioned, leads

me to think that under such circumstances it is absolutely impossible to procure anything savoring of real antisepsis; that the best way to achieve that is by the maintenance of a dry field.

In regard to the flushing of the bladder. The doctor is under an erroneous impression if he thinks I meant to wipe out the entire bladder. That is not the fact. Real hot solutions may be applied to bleeding points only. The dry field is also of advantage where we have opened the bladder and then find it necessary to extend the incision into the peritoneal cavity.

As to the technique of illumination, I have not been quite so fortunate as the doctor in regard to illumination of the interior of the bladder, and my observation of the work of a number of other operators has convinced me that that is the case, notwithstanding very large exposures. Unnecessary traction on the bladder is avoided by proper illumination with this illuminator or any similar one that will properly illuminate the field.

Dr. Squier, unfortunately, is unable to be here, on account of serious illness in his family, and he has asked me to say just a word about what he found in connection with the use of the bi-polar spark. Before taking up this subject I should like to report the case of a man seventy years old, who died a week ago. This man had a growth situated on the antero-lateral wall of the bladder, with no relative enlargement of the prostate, and no marked induration. The pathological report is as follows:

"Examination of sections of the urinary bladder in which you are interested shows no involvement of the muscular coat of the bladder. The mucous membrane, at the site of the original tumor mass, shows a mass of necrotic fibrin infiltrated with red blood cells and the remains of the original epithelial papilloma. Examination of the prostate shows in a few places evidence of beginning malignancy."

This shows that we had a malignant prostate to begin with and a relatively benign growth of the bladder wall. In view of the deep penetration of the bi-polar spark, Dr. Squier and myself were induced to have copper electrodes made, to be used in suprapubic operations in cases which were otherwise hopeless. We employed that in two or three cases, and the result has been very remarkable. One patient was almost exsanguinated, and was operated on only at the urgent solicitation of the patient's wife. We found the bladder practically full of growths, some flat, some of a papillomatous character. These were treated with the bi-polar spark. Some of them could be absolutely removed with the spark without bleeding. The hematuria disappeared completely, and the patient remained

for thirty days without macroscopic blood. At the end of that time the patient's respiration and pulse went up and he died in twenty-four hours. The bladder was obtained, the mucosa found to be smooth and showing a number of petechial spots. The peritoneal side showed no extension through the wall, and Dr. Sondern was given the organ for examination. He also had a specimen of the growth at the time of the operation, and reported by him as a rapid growing carcinoma. Two weeks ago he examined this bladder and reported that, notwithstanding a very careful search, he failed to find any evidence of malignancy. That naturally surprised us considerably, and we had him go over it again, and he has made three successive reports on that case wherein he has failed to find the slightest vestige of malignancy after thirty days. With that report in mind, Dr. Squier had Dr. Wood inoculate some mice with carcinoma and sarcoma and he sparked these growths, and the report has been received from Dr. Wood that the site of the neoplasms and the tissues all about them are absolutely free from any vestige of malignancy. The mice died of duodenal ulcer.

THE TRAINING OF THE UROLOGIST.

HUGH CABOT,
BOSTON, MASS.

At the last meeting of this association, I asked your consideration of the question, "Is Urology entitled to be regarded as a specialty?" As that question has been answered in the affirmative, it now becomes our duty to point out what the training of a urologist should be. We believe that "the old order changeth" and that advance compels a rearrangement of the departments of medicine and a readjustment of specialities. It therefore becomes our business to see that the men who are to do this work, who are to put Urology in the place where it belongs, are properly equipped, for unless we see to it, be well assured that it will not be done. Since we claim for Urology the rights of a specialty, we must see that our successors are properly equipped to advance the cause.

At the outset we cannot discuss the training of a urologist without first considering what is the field which he must cover. The urologist has come into being because of a wide-spread dissatisfaction with the lines as at present drawn. The genito-urinary surgeon has existed, more or less as a specialist, for half a century but his work has gravitated more and more into the lines of venerology and this not from accidental causes. It should not be overlooked that when a man elects a narrow field for his activities, that field will in time react upon him. Narrowness

breeds narrowness and surroundings have an inevitable effect upon character. The tendency of the genito-urinary surgeon to gravitate into the care of venereal disease is no accident. It is but a natural and probable consequence of his decision to deal with the diseases peculiar not only to one region but to one sex. As the line was drawn and as the process was proceeding, it required no prophetic vision to see the total extinction of any sound specialty devoted to the diseases of the male genito-urinary system. Furthermore, the division had no sound basis, as the essential lesions of the urinary system are the same in both sexes and with the exception of certain conditions of the bladder, vary in no important particular.

Parallel with the fall of the genito-urinary surgeon is that of the gynecologist. His specialty has proved too narrow and has led with mathematical accuracy to a surgical myopia. Those who have stuck strictly to their field are being strangled by their specialty. The larger and bolder spirits have attempted to take over the field of abdominal surgery with which their work has no logical connection and in which they can claim no superiority over the well-equipped general surgeon.

The field of urology, then, must in the natural order of events cover that of the old genito-urinary surgeon and part of that occupied by the gynecologist. It is true enough that the average gynecologist has known far too little of the urinary system and to that, in part, is due his downfall. But it is more importantly due to the fact that his work was in no true sense a specialty and that the narrow field has strangled endeavor. Such portions of the work of the gynecologist as deal with the results of obstetrical lesions belong properly to the obstetrical specialist and to him they will ultimately gravitate. Such portions

of his field as lie wholly within the abdominal, belong to the well-equipped general surgeon, while the lesions involving the urinary tract, directly or indirectly, must ultimately come under the province of the well-equipped urologist. Thus the old order changes. Sub-divisions of the field of surgery change and gravitate into a natural and logical relation and any specialty which expects to stand upon a permanent basis must mark out for itself a field sufficiently wide to tax the capacity of the largest individual so that he may avoid the inevitable dangers, either of being narrowed to the vanishing point or of being obliged to take over other and not properly allied territory in order to allow for growth. It is not a question of what I believe or what you believe, but is the natural and inevitable result of forces far greater than the individual. Progress will hew to the line, whether we like the position of the falling chips or not.

This then, is the field of the urologist. He must know, in all its ramifications, the conditions of the urinary tract in both sexes. He must, because of anatomical facts, know the genital tract of the male and to a somewhat less extent he must master the lesions of the genital tract of the female. The parts of this field are soundly correlated and they will provide a specialty wide enough to tax the capacity of the largest mind, while giving infinite play to the particular hobbies of the smallest individual.

Clearly the equipment for work in this field will not be achieved by a few years of casual study. The specialist who makes his mark here will not be produced by an ordinary medical training, a few weeks in foreign clinics and an extraordinary ability to plagiarize the work of others. He must be grounded firmly. He must be equipped with the soundness of judgment characteristic of the general surgeon and he must acquire the technical skill essential to the

study of the urinary lesions. Let us be more specific. The student who aims to be a urologist, if such prevision exists, must have had a sound medical training and the customary experience of a hospital training. That hospital training must have given him a comprehensive view of the field of general surgery and cannot be obtained in those institutions which divide the interne's course between medicine, surgery and various specialties. He must devote himself for not less than one year, as an interne, to surgery. At this point, he will reach the parting of the ways and will probably be able to decide whether his part in the scheme of things lies in general surgery or in one of the specialties of surgery. Should he elect urology, further training in general surgery is essential to success. As the possibilities exist at present in this country, he has one of two choices. He may either become a surgical resident at one of a few hospitals or he may associate himself, if he be fortunate, with a general surgeon in large practice, with whose work he will become familiar and from whom and with whom he will acquire sound surgical judgment. If it seem to any that I lay too much stress upon the requisites of a general surgical training, let it be remembered that the surgery of the urinary tract, in many of its branches, is the most major of major surgery, that surgical skill, boldness and judgment are nowhere more necessary than in dealing successfully with the graver lesions of the kidney and the bladder. It is my own opinion that the successful urologist can arrive at his own only through the portal of general surgery and that it is while in the practice of general surgery that it will become clear to him that he is particularly equipped by temperament to become a specialist. At this point he may wisely begin the study of the methods of examination belonging essentially to urology and may start upon

the long road which produces a skillful cystoscopist. If any one believes that a cystoscopist can be produced in a few months, he has only to watch for a brief period the work of one equipped with a few months' training, to arrive at the conclusion that this is no simple business. Though the belief seems to be current that a brief course in cystoscopy will suffice to equip the practitioner to undertake this work, conviction grows upon me that this is a fundamental error. The ill-trained cystoscopist is more likely to arrive at conclusions dangerous to his patient than to add to the sum of useful knowledge. Today the worst menace of urology lies in the failure of the general surgeon to appreciate that years of training are essential to these delicate manipulations and to the ability to distinguish, surely and rapidly, the varied manifestations of bladder disease. The exact method by which the young practitioner trained in general surgery shall acquire his urological experience cannot be laid down dogmatically. It must necessarily depend upon the opportunities for study which his environment offers and the extent to which it is financially possible for him to neglect the practice of medicine in order to acquire a specialist's training. Whatever method may be selected, it should be appreciated at the outset that it is a matter of years and not a matter of months. For the recent resident in surgery probably the most available method is to attach himself directly to a trained urologist and stick there until he has acquired a well-rounded experience. For those who have found it best to associate themselves with a general surgeon, it will perhaps be possible to acquire urological skill by devoting a part of their day to hospital work in this line without abandoning at once their general surgery. More and more, however, the specialist must be deliberately produced by becoming the assistant of some trained

urologist and leaving him, to settle elsewhere, when his training is complete.

It may reasonably be questioned whether a well-rounded view of the field can be obtained from experience in any one clinic and it is undoubtedly highly desirable that the work of more than one individual should be studied. I think we have much to gain and little to lose by a system of interchange of assistants and that not only the assistant but the chief would gain by the fresh view-point thus obtained. There are probably a great variety of individual roads which may lead to the desired result, namely, a well-rounded specialist. Which of them be chosen, I care not, so long as it be clearly understood that the specialist of the future will succeed or fail according as his equipment includes three important features. He may be said to stand upon a tripod, consisting of a mind fitted to struggle with problems, a sound foundation in general surgery with its accompanying surgical judgment, and highly developed skill in the delicate manipulations in which the cystoscope plays so large a part.

There is one thing more in the training of the urologist to which I would ask your attention. Social unrest arising from inequalities in the social scale is the most important present phenomenon of our civilization. More and more thinking men are realizing that this is not the chatter of cranks but a failure in our development that will require the full application of the best minds for its solution. No group of men is brought more constantly into contact with these problems than physicians. No one of these problems is more difficult and far reaching than that of the relation between the sexes, involving, as it does, not only the whole question of marriage and divorce, but also the various diseases and disabilities arising from the relation. In no department of medicine do these

questions confront the physician with more force than in urology. Any man who takes up this work will find himself deeply involved in these problems. He cannot well plead as an excuse that his duty begins and ends with the treatment of disease. It is all too clear that more and more demand is being made on the physician for expert advice in preventive medicine and he must either fit himself for this work or give up his job. The future urologist must devote time and study to social questions that he may help to guide a public opinion which is now fully aroused to their importance and anxious to apply a remedy. He will need to bring to these questions the best that his mind affords, for they are intricate, involve time-honored if shop-worn moral standards and arouse passionate defence of long-standing, if imaginary rights.

SOME GENITO-URINARY SURGERY RECENTLY DONE IN VIENNA AND BERLIN.

CHARLES E. BARNETT,
FORT WAYNE, IND.

To see how the other fellow does his work, no matter whether it is poorer or better than your own, is of interest, so I will give you a brief report of some urologic work that I have recently seen at the clinics of Vienna and Berlin.

The writer found the assistants in Vienna, doing far more operative work than usual and was given as a cause, that on account of a possible internal war following Franze Joseph's death, the assistants were in training preparatory for military surgery. On this account the anæsthesists were frequently the lesser military surgeons. The trained anæsthesist is almost an unknown quantity there. The anæsthetic predominating was chloroform. Some were using the old Billroth mixture (A. 40%, E. 30%, C. 30%) and swearing by it. Ether is seldom used and nitrous oxide gas was never used. Local anæsthesia is frequently done, both spinal and otherwise, for major operations. Iodin solution is almost universally used in skin sterilization following the "wash-up." It is also frequently used again following the operation.

Silk is still the favorite ligature and suture material for use everywhere, yet the writer finds the best operators using much more catgut than heretofore, especially in the region of the mucous membrane.

The genito-urinary surgeon is in advance of the general surgeon in that regard.

The X-ray work in kidney and ureteral stone is most admirable and in the writer's opinion even excels our work here.

Litholopaxy with one per cent eucain anæsthesia is done on all bladder stones small enough to crush, giving the patient a second or third sitting if necessary. The Thompson or Bigelow lithotrite (Weiss) is most generally used. The writer saw one case done by Zuckerkandl (secondary) whereby the cystoscope showed four stones small enough to be evacuated without the use of the lithotrite.

In conversation with Von Frisch the writer has the following notes:—

Feb. 10, 1912. Does internal urethrotomy followed by Kohlmann dilatation. Prefers graduated steel sounds for most strictures. Indigo carmin for kidney functional test; doesn't know phenolsulphonephthalein test. Kidney test dependent upon examination of urine from catheterized ureters. Unfavorable results with pyelography. Uses autogenous vaccines but does not know about reaction from vaccine; results questionable. Oxcynide of mercury, silver nitrate and permanganate in chronic posterior urethritis. Believes in Tandler's idea of so-called middle lobe enlargement and consequently does suprapubic prostatectomy. Says suprapubic prostatectomy is easier than perineal and that is the reason for doing it that way.

Feb. 10, 1912. Finger, in speaking of salvarsan, lays especial stress upon its danger in cases of true organic nerve lesions. Intravenous administration is practically the method followed by all.

The following operative cases taken from my notes cover portions of the means for diagnosis, after-treatment and surgical technique of a few of the operators

in ureteral stone, kidney stone, tubercular nephrectomy, hysterectomy and suprapubic prostatectomy.

Feb. 8. (Zuckerkandl.) Ureteral stone; shadow showed below sacro-iliac synchondrosis. Supra-poupart-lumbar incision; opened peritoneum by mistake; closed peritoneum; mistook external iliac artery for ureter until the pulsations were felt; finally found ureter; brought stone from bladder muscularis; showed stone; cut down on it; removed same; closed ureter with catgut; drained with iodoform gauze and rubber drainage tube.

Feb. 22. (Zuckerkandl.) Right nephro-lithiasis; X-ray photo showed large stone in two segments; usual incision; patient in "kidney box" (saddle) with thorax slightly downward; opened down to fat; dissected kidney fascia loose with tissue forceps; delivered kidney; opened lower pole; delivered small stone, then large one; closed kidney; deep Halstead sutures (catgut) with long slender needle; superficial with interrupted catgut; drain, iodoform gauze and tube to lower fossa; closed lumbar fascia and muscles with interrupted catgut; silk for skin.

Feb. 13. (Zuckerkandl.) Double orchectomy for tuberculosis; gives carbolic acid treatment to vas afterward.

Feb. 15. (Zuckerkandl.) Tubercular kidney; on account of inability to catheterize either ureter and consequently unable to do phenolsulphonephthalein test, he first opened down to left kidney; found it cystic; he then did a right nephrotomy; found right kidney good; put in temporary drain; closed with catgut, and silk for skin; re-opened left wound; removed small cystic kidney with much difficulty from hemorrhage after ligating stump; fixed ureter stump with catgut (iodized); brought both ends out of opening in drainage tube; fixed tube thus to ureter; would have fixed ureter to skin had same been

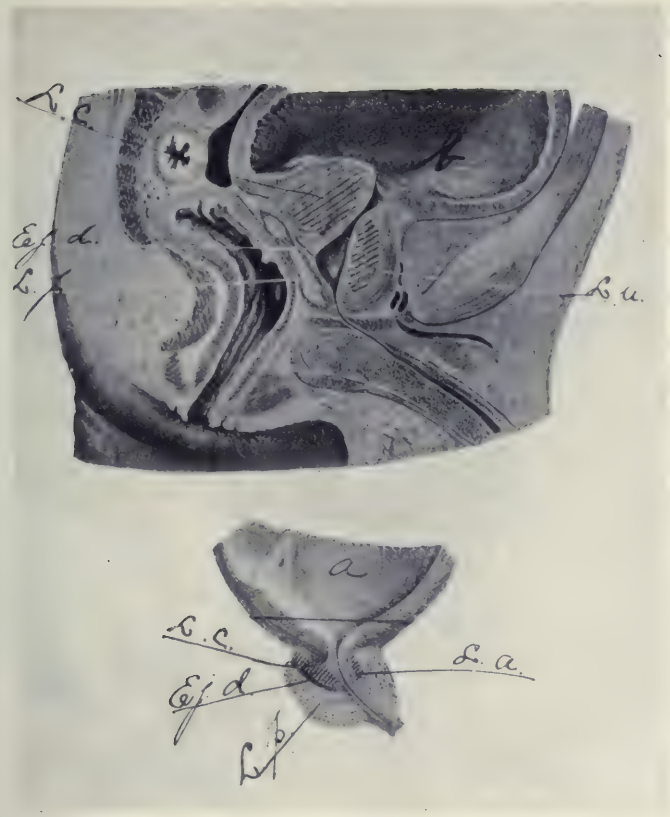


Fig. I.

Shows Zuckerkandl's illustration of the Tandler-Zuckerkandl-Stöerk-Alberans' theory supporting suprapubic prostatectomy.

(*a*) Shows normal gland with centers for hypertrophy in the (L. c.) Lobus centralis (Alberan's), and (L. a.) lobus anterior, also the (L. p.) lobus posterior and (Ej. d.) ejaculatory ducts.

(*b*) Shows the relation after hypertrophy has taken place thus leaving the lateral lobes freed from hypertrophic changes.

Fig. II.

Shows a cross section of an adenomatous prostate. Running through the lower third you see the probe marking the ejaculatory duct fissure, thus showing the fallacy of the possibility of removing the gland without destroying the ejaculatory ducts. This condition is present in practically all large prostates.

Fig. III.

Shows the cross-sected gland of Fig. 2 replaced against its fellow, with the sinus pocularis looking toward you with the end of the probe passed out from the utriculus masculinis. This again shows the impossibility of removing the gland without disturbing the utricle and ejaculatory ducts. (The pathologic seminal vesicles, vas ampulla and vasii have no bearing on this paper.)

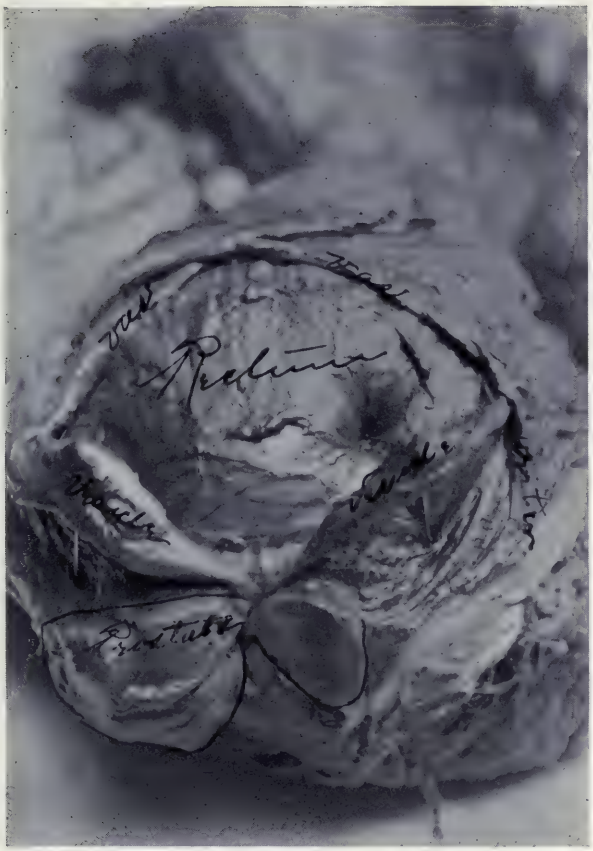


Fig. IV.

Shows a bisected prostate whereby the left half is entirely adenomatous above and myo-adenomatous below. A suprapubic prostatectomy would likely leave the myo-adenomatous portion remaining for a possible future pathologic change to take place.

Fig. V.

Shows a fibromatous prostate,—one that would be extremely hard to attack and remove by the suprapubic route, on account of the fibrosis running up and including the seminal vesicles.

mobile; (will treat ureter stump through tube with carbolic acid;) iodoform gauze in kidney fossa; closed in usual way; tuberculin not used post operative.

Feb. 26. (Israel.) Nephrectomy, left kidney, for tuberculosis. Diagnosis: Found T. B. in urine; no phenolsulphonephthalein used; does not believe in it; indigo carmin good enough; no tuberculin used for either diagnosis or for treatment; ureteral catheter in ureter for one hour is dangerous; incision from twelfth rib to anteror spine down to kidney fat; kidney loosed throughout; ureter isolated; renal vessels ligated with catgut; kidney severed from renal vessels; ureter dissected down low and clamped; upper ureter clamped and severed; ureter catheter introduced; pure carbolic acid injected and then withdrawn; catheter and sponges removed; drain put in kidney fossa temporarily; fascia closed with catgut; skin closed with silk.

Feb. 16. (Wertheim.) Panhysterectomy attempted, assistant's hands used for retracting; left broad ligament nicely severed; ureter shown and dissection made down into the vagina; right side was found impossible on account of ureter occupying cancer mass; hysterectomy was abandoned and all peritoneal surfaces closed again with silk; in closing the belly two silk skin stay sutures were used and the rest of the skin closed with metal clips. Wertheim's operative mortality is now six per cent; five years longevity, sixty per cent; all cases carefully selected; he does vaginal hysterectomy in non-malignant cases and prefers bisecting the uterus.

Feb. 22. (Zuckerkandl.) Suprapubic prostatectomy; (two weeks preparatory treatment;) local anæsthesia; mild per cent of eucain; first skin, then under fascia; then between skin and fascia; then through perineum to prostatic region with finger in rectum; some chloroform was found necessary; supra-

pubic incision; bladder found distended; opened with knife; put in specula retractors, after removing a quantity of stones; prostatic hypertrophy was shown at bladder neck; introduced "screw"; did not hold well; clipped mucosa with scissors and knife; assisted by assistant's finger in rectum; prostate was finally enucleated; not very large; showed ureteral opening with mucosa; irrigated with hot salt solution; put in No. 20 (English) tube hooked at right angles with smaller drain; irrigated through urethra and out through drain tube; collodion poured over under dressing ceiling wound; patient returned to bed in Fowler's position; dressing left on for two days unless tube stops up from clot; no irrigation is done if natural drainage is competent; ureteral catheter passed in seven days, at which time irrigations are begun.

Zuckerkandl said that perineal prostatectomy was frequently followed by incontinence, fistula, etc., and that it was harder to do, while suprapubic left no incontinence nor fistulæ; his reason for changing to the suprapubic way was mostly due to the Tandler-Zuckerkandl-Stoerk-Albarrans' investigations indicating that the upper bladder (lobus centralis) (see cuts) portion of prostate was always the adanomatous portion; his first mortality per cent was greater than in his perineal prostatectomies; now it is better, but still above his perineal mark.

DISCUSSION

OF PAPERS OF DRS. CABOT AND BARNETT.

DR. RAMON GUITERAS of New York: This present Association of ours was founded on about the lines that Dr. Cabot has outlined. We included especially genito-urinary specialists and gynecologists. There were more genito-urinary men than gynecologists; also a large number of general surgeons, and also men interested in making urinary and laboratory examinations. The ideal urologist probably is a man who is a combination of a gynecologist and a genito-urinary surgeon, one who understands the urinary tract in both sexes, and one who understands the part of the genital tract associated with the urinary tract in both sexes.

Kidney surgery in women is probably as abundant, if not more abundant than in the male. Bladder surgery is probably more abundant in the male, but there are two great differences in the bladder affections in men and women. In men bladder diseases are generally due to intravesical obstructive causes, in women to extravesical causes. Therefore, it is well for a man who is doing urology as a specialty to understand pelvic disorders in women, because exudates, adhesions of the Fallopian tubes and other different pelvic conditions in the female have a great deal to do with their bladder disturbances.

Regarding the question of equipment and of surgical technique and surgical knowledge: Of course, a surgical training is the basis of urology as a surgical specialty. Also, a urologist should be a scientific and an expert cystoscopist. At the same time, a general surgeon who has the aid of men who are working in what I might call accessory branches is just as well able to treat urological cases from the surgical point of view as a urologist, because he can have his cystoscopies done by an expert cystoscopist, he can have his urine examined by an expert, and he can also have radiographs made by an expert radiographer; and after all these are the principal findings needed, and we in doing urological work have to rely on expert radiographers and men making the best urinalyses in order to have our own work satisfactory.

DR. EDWARD L. KEYES, JR., of New York: Dr. Cabot's paper has covered the ground so completely to my satisfaction

that I have nothing further to add to it. I only wish I could find some flaw in it. I took the trouble to read it over after he had finished, and failed to find anything to disagree with. I can only applaud.

DR. HENRY JACOBSON of St. Louis: I am glad that Dr. Kolischer was one of the first in the West to combine gynecology and genito-urinary diseases in one specialty. I think that is ideal. I have always believed we should combine the two special branches of medicine. How often we see the gonococcus in women starting at the urethra and vagina and cervix and going up to the tubes, and we have to follow it and be able to remove the tube if necessary, unless we refer the case to some other surgeon. Why shouldn't we do that ourselves? The abdominal surgeon has attempted to take the kidney operations away from us, and we can just as well combine these two.

With the cystoscope you have to be constantly at it to be an expert with it, but I believe Dr. Cabot's statements about the training of the urologist with a surgeon for a number of years and think that is absolutely right. After doing the work with the surgeon you should watch operations as much as possible, especially on the bladder and kidney, and if possible be an assistant for a number of years. Of course, a number of men have to do laboratory work for us. The Wasserman test has to be done for us. The complement test for gonorrhœa has to be made for us by serologists. So we ought to do the surgical operations ourselves; especially anything that pertains to urology.

DR. WALKER: I have been very much interested in Dr. Cabot's paper, and if I were to offer any criticism at all it is in the foundation. I do not believe that a student of medicine with one or two years in a hospital has a foundation sufficient for any specialty. We must have first a thorough grounding in the whole science of medicine. There is no absolute distinction between any branch of medicine. There is no distinction between surgery and medicine. In fact, I think medicine is an unfortunate misnomer, because we are really studying the same thing.

So far as my observation goes, the unfortunate mistake in our specialty has been in these too-rapidly-baked specialists who have not gone thoroughly into every other branch of medicine. The mistake that specialists make every day, as well as

all the rest of us, is the lack of the study of general diagnosis, because we cannot separate any organ or any set of organs entirely from the rest of the body, and in order to acquire this diagnostic skill it requires not only careful, studious experience, and not only experience that you obtain under other people, but individual experience in which you make your mistakes and correct them, and by a careful study of every branch. So I think that the old rule that a number of years of general work is absolutely essential for any specialists. I do myself a very general work, and I frequently have patients that are referred to me for operation,—cases of locomotor ataxia, for instance. A case that I observed last year had a diagnosis of gastric ulcer by the general man and a stomach specialist. His trouble was not ulcer but locomotor ataxia. In fact, we are in every case liable to be called to make the diagnosis in any branch, and it is only by careful work that we can make the diagnosis. With Dr. Cabot's superstructure and with a little more foundation I think our training would be right.

DR. O. S. FOWLER of Denver: I would like to say a word as to how a man cannot become a genito-urinary surgeon, and that is by being willing to be the cystoscopist and make the diagnosis for the general man. You will never become a genito-urinary surgeon as long as you are willing to do that. They will use you more every year, because you become more expert and your advice is more valuable every year. As long as you are willing to diagnose the case for the occasional operator and tell him what to do, or tell the patient what should be done, that operator who is not as capable a surgeon as you are will do an operation which is not a credit to your advice and will reflect in many cases upon your advice.

I do not believe that the general surgeons today realize the importance of cystoscopy in connection with their work. They are constantly operating cases, calling them exploratory operations, where if they had given the individual a satisfactory examination, including a cystoscopy and perhaps a radiography, they would have been able to arrive at an accurate diagnosis.

If we as a class of genito-urinary surgeons or cystoscopists will refuse to diagnose a case unless we are co-operators in that case,—unless we do that we never can hope to gain the recognition which our specialty deserves. In my own experience in the last year I have had cases sent in from the outlying towns from occasional operators who will take the patients home and operate upon them, and in every instance the result has reflected upon

my advice, and I believe if that advice had been properly carried out the result would have been different. As long as we are willing to make diagnosticians of ourselves we are always going to be diagnosticians.

DR. GUITERAS: I should like to ask Dr. Cabot whether urology should include also the non-operative forms of nephritis. Albarran in Paris, probably the leading urologist in the world, thought that the non-suppurative nephritides should come under the head of urology, and in the different international congresses he has taken part in the medical section in the discussion of nephritis.

DR. CHARLES E. BARNETT of Fort Wayne, Ind.: I believe as I did last year. I want first to ask Dr. Cabot whether he included the genital portion of the female in his paper. I understood him to exclude that portion.

Dr. Cabot: I said that I thought a knowledge of the genital tract in the female was essential.

Dr. Barnett: Not the operative?

Dr. Cabot: No.

Dr. Barnett: I believe that that should also be included, because seven-tenths of the gynecological operations are genito-urinary surgery of the female.

A man can treat the genito-urinary diseases and border onto its surgery, or he can do major surgery and border onto treatment, or limit himself to the treatment portion or do just the surgical portion and still be one of the urological "clan."

The greater knowledge the man has, the more he will know his shortcomings and inability to do big things. The little man today in the country thinks he can cure a case of "clap" better than anybody else, because he has a limited knowledge of the disease. So a man must have a broad knowledge in order to cover any one of these fields, and especially the major surgical field. We necessarily will be a body of men composed of genito-urinary surgeons, gynecologists, and the ones engaged in the treatment of genito-urinary diseases, with a sliding scale of combination running in either direction.

DR. LOUIS E. SCHMIDT of Chicago: My address tomorrow is practically an answer to Dr. Cabot's address last year. I am under the impression that the subject of genito-urinary surgery was discussed more than the medical end. I will bring up in the address tomorrow, the question as to what we should really

consider as urology, and furthermore as to whether we should really like to be known as urologists or genito-urinary surgeons or what not. I am under the impression that some of us are at a loss as to what we should really take up. Of course, a society of this kind can include whatever it cares to, or exclude whatever it wishes. I think it is high time for the discussion to become more general so that we can state definitely what we wish to include in our specialty, what the object of the Association is and what we wish to be known as.

DR. CABOT: In answer to Dr. Guiteras' question, I perfectly intentionally omitted to discuss that subject because it seems to me the whole tendency at the present time is in the direction of the belief that the origin of the so-called medical conditions of the kidney is entirely outside of the kidney and that they will belong in the field of general medicine; that they are results to the kidney comparable to the results to the heart and to the vessels of other origin, and consequently gravitating naturally into other fields.

I am sorry to disagree with Dr. Guiteras in his view that the general surgeon, surrounded by a handsome group of satelitic specialists, is the equal of the urologist in the surgery of the urinary tract.

A CASE OF BURN OF THE URETHRA WITH LUNAR CAUSTIC FOLLOWED BY A COMPLETE CAST OF THE URETHRA.

VICTOR COX PEDERSEN,
NEW YORK.

Sloughs of the urethra in the form of complete casts are not very common, because the origin of such sloughs is in itself unusual, namely, the introduction of caustic sufficiently strong to destroy the mucous membrane in its entirety for a considerable extent of the urethra. The following is an example of a silver nitrate burn of the urethra, followed by a complete cast about five inches long, as shown in the photograph.

A. M. T., about twenty-eight years old, white, single, machinist. He admitted syphilis and a number of attacks of gonorrhœa, which he had treated more or less successfully himself with proprietary and other means obtained through druggists' advice. He also admitted a moderate stricture. When first seen he was engaged to be married, with the usual result of positive stimulation of his sexual appetite. In gratifying this, he acquired a gonorrhœa. Realizing that his approaching marrige rendered the promptest possible cure necessary, he reported at a drug store and asked for a "bougie used to burn it out." He claimed that he showed the druggist the approximate length of the bougie. Through error or carelessness, the druggist gave the man a stick of silver nitrate, which the patient accepted after demurring and stating that

he thought it might be right, but was not certain. Even this attitude of doubt did not seem to impress the druggist with the likelihood that a mistake was being made. The patient went home, introduced the caustic into his urethra, which he said was followed by excruciating pain and then by loss of sensation. The caustic did not remain in the urethra many minutes, and soon the pain began again with agonizing chordee and profuse discharge.

When first seen, the patient presented a penis which was twice its natural size, a free discharge, at first without, later with gonococci, obstruction through which he could barely urinate, and in short, a pitiable condition. The lining of the canal seemed necrosed for a sixteenth of an inch in depth, including, of course, the entire thickness of the mucosa. The patient was taken to the hospital, the deep urethra was buttonholed, the bladder drained, and both these regions were irrigated two or three times a day with a weak permanganate of potash solution. Both bladder and deep urethra remained uninfected under this treatment. In about four days, a slough of the anterior urethra was cast in one piece about five inches long, and is shown rather well in the photograph.

The case thereafter made an uneventful recovery, excepting for the fact that the first four or five inches of the anterior urethra were converted into a dense stricture, which could not be dilated above 23 F. About eighteen months after this wretched accident, partly through brooding over his condition, partly through disappointment through the breaking of his engagement to be married, and partly through the syphilis, the man went insane, and is today an inmate in one of the public institutes. The superintendent of this asylum reports as follows as to his present condition:—

STATE OF NEW YORK.
CENTRAL ISLIP STATE HOSPITAL,
CENTRAL ISLIP, LONG ISLAND.
G. A. SMITH, M. D., Superintendent.

November 14, 1911.

In re A. M. T.

Dr. V. C. Pedersen,
45 West 9th Street, New York City.

Dear Doctor:—

Referring to your letter of recent date regarding the above patient, would state that during his residence here he has not suffered any discomfort from his urethral condition. Over one year and a half ago, while at Ward's Island, he was treated with sounds, but this treatment has not been required here.

He is a case of dementia præcox of the paranoid type, and not a suitable patient to examine with instruments, except under an anesthetic, for he is very excitable, resistive and assaulting.

Very truly yours,
(Signed) G. A. SMITH, Superintendent.

Not the least of this poor patient's calamity is the fact that his insanity has necessarily nonsuited him in his claim for damages against the druggist who was responsible for this very pathetic blunder. A remarkable feature of this case is the fact that notwithstanding the intense damage to the urethra the patient even now has comparatively little obstruction, although the first four or five inches are converted into a solid cicatricial mass.

The case seems sufficiently unique to merit individual publication.

DISCUSSION

OF PAPER OF DR. PEDERSEN.

DR. HENRY JACOBSON of St. Louis: I wish to report a case in line with Dr. Pedersen's case. Several years ago I gave a man an injection of argyrol, a solution I had had made up about ten days before. He came back to me the next day with his penis swollen about four times as large as normal, and after about ten days' treatment with a mild solution it regained its normal size. I wrote to the people who make the argyrol, and at that time they gave me instructions — which I am sure you all know — that the solution should be made up fresh every two or three days. I unfortunately had kept the argyrol about ten days. I have observed this patient from time to time, and he has not developed a stricture.

DR. O. S. FOWLER of Denver: I might report a case somewhat similar to these in which pure lysol was used by the patient, with a sloughing of the anterior portion of the urethra and a large portion of the glans penis. When he came to me he had a stricture at the deeper portion of the sloughing area which would only admit a No. 11 French. With a series of dilatations I succeeded in getting the caliber to normal size, and then by another series of plastic operations I was able to change the funnel-mouthed aperture to a proper and normal meatus.

DR. MARTIN W. WARE of New York: I want to report a case that was being treated by one of the members of this Association. In so doing he put a preliminary injection of cocain, as he thought, into the urethra; instead of that he learned that he had used pure carbolic acid. Naturally the patient did not feel the injection. I saw him subsequently, and he had a severe urethritis, without much enlargement of the organ. The surprise in the case was the subsequent course. He had no stricture whatever, and up to this time the canal presents a sclerotic appearance, but no stricture. It would seem from the favorable outcome in these cases that these poisons do not seem to compare with the toxic products of gonorrhœa, which very often leaves the most obstinate kind of strictures behind.

DR. GEORGE K. SWINBURNE of New York: I want to report a case I had in my office. I was about to use the urethroscope and intended to inject cocaine, but injected a syringe-full of twenty per cent silver nitrate. The patient complained of its burning, and I let it out and injected a syringe-full eight per cent cocaine, let it out, and then again filled the urethra with eight per cent cocaine, and held it in for several minutes. Nothing occurred at all. I was very glad, because I expected to get a slough of the entire urethra. I mention that, because anybody is likely with several bottles on his table to inject from the wrong bottle. For some time I have kept an eight per cent solution of cocaine on my table as a stock solution for making up weaker solutions.

The gentlemen who had argyrol only ten days old followed by such dire results surprises me, because I have frequently had patients come back to me who have had a bottle of argyrol they have had for a year, and before coming they have used this argyrol, and it has not had the slightest effect other than a freshly-made solution would have.

DR. FREDERIC BIERHOFF of New York: In line with the paper that has just been read, I should like to report several experiences of this kind.

The first was in the case of a colleague who came to me after he had injected a strong solution of bichloride of mercury. In his case a slough of the urethra occurred, but no subsequent stricture.

The second was a case in which, contrary to my instructions my nurse in the hospital, instead of preparing a one to twenty thousand bichloride of mercury solution for irrigation, prepared a one to three thousand solution. Within a moment after I had begun to irrigate the urethra the patient complained of intense burning, and fortunately I suspected the nurse had made a mistake and interrupted the irrigation. I then irrigated with a saline solution, with the result that within a quarter of an hour I was able to determine the presence of a cast of the urethra. A thin membrane peeled off of the wall of the canal, and it was possible with dressing forceps to withdraw this cast. The patient was under treatment for a renal and prostatic condition, and it was possible for me to observe him for a considerable length of time in the hospital following this mishap, and to my gratification there was no further result than a muco-purulent discharge for several days. I have seen him at intervals since, and there has been no stricture.

The most extensive and resistent stricture I have ever met was in a patient who came to me because of difficulty in urination. The history was that about twenty years prior to my seeing him he had been treated by a physician for a gonorrhœa and the physician — who, by the way, was not sound mentally — whether as the result of accident or intention, irrigated the patient with a strong solution of chloride of zinc. Just what the strength was I have never been able to find out. The result was, as he tells me, excruciating agony, the necessity for a perineal section, and the passage of sounds for years afterwards. When I saw him he had not been dilated for some time, and his urethral canal had shut down to such an extent that urination was only possible upon great straining, and then the stream only dribbled out. It was impossible, owing to the dense character of the stricture, which involved the entire anterior urethra, to pass higher than a No. 12 French, and that with great difficulty. I attempted to dilate, but found that owing to the resistent character of the stricture it was utterly impossible to raise his caliber more than one or two numbers of the French scale. Finally we decided to do a perineal section and to do a retrograde urethrotomy. We succeeded in doing this, and dilated him up to thirty-three French; but to my great regret within two or three weeks after the operation, and in spite of attempts to keep the caliber of the urethra near the point that it had been at the time of the operation, the stricture contracted again, the perineal wound, which had healed nicely, again broke open, and at the present time the man has his stricture almost of the same caliber as prior to the urethrotomy plus a perineal wound.

DR. PEDERSEN: I feel indebted for so liberal a discussion of a single case.

With regard to the fresh argyrol solutions, I would say that one of the leading opthalmologists of this city told me recently that he had found it unnecessary to make up fresh solutions. Perhaps the original argyrol required it. Perhaps also it is a stroke of business on the part of the manufacturers to cause doctors to use as much as possible of the drug and thus augment sales.

With regard to the bichloride burns, I recall the case of a prostitute who, arguing that if one tablet in a certain quantity of water would do good, a whole handful in the same amount of water would do more good, and proceeded to douche with a solution containing a handful. She came into the New York

hospital when I was an interne there, and in three or four days she cast a slough of the entire vagina. We feared that she would get a very pitiable condition, perhaps adhesions and closure of the vagina, but in that case up to a month or two after her discharge from the hospital nothing of this kind had happened to her. She was thereafter lost sight of entirely. The specimen was kept and was, if I am not mistaken, the only one of its kind in the Pathological Museum of the hospital.

EPIDIDYMO-ORCHITIS COMPLICATING TYPHOID FEVER.

GEORGE G. SMITH,
BOSTON, MASS.

Inflammation of the epididymis and testicle in connection with typhoid fever has been described a score of times since Velpeau,[1] in 1844, stated the fact of its occurrence. Wescott was the first to collect a series of cases from the literature, the summary of which may be found in Keen's monograph on "The Surgical Complications of Typhoid Fever," published in 1898. Eshner[2] in that same year gathered forty-two cases and added two. Kinnicutt[3] in 1901, Blumenfeld[4] in 1905, Beardsley[5] in 1908, and Pike[1] in 1911 reviewed the subject to date and added new reports until the last-mentioned writer had something over one hundred cases at hand.

That this is an unusual complication of typhoid is evident from the small number of cases which any writer can report from his personal experience. Among fourteen thousand seven hundred and thirty-eight cases of typhoid fever gathered from German and French reports, Pierre Do[3] could find no cases of epididymo-orchitis. Osler,[3] in eight hundred and twenty-nine cases, found two with this complication, and Kinnicutt reported an equal number from eight hundred and eighty-nine[3] at the Presbyterian Hospital.

It is not the purpose of this paper to consider in detail those facts which have already been determined

by statistics. We are told the degree of severity of the typhoid fever bears no relation to the degree of inflammation of the testicle and epididymis. It is stated that this complication occurs late in the course of the fever, or during convalescence; in proof of this, Beardsley [5] found seventy-one cases occurring in convalescence, some as late as the sixth or seventh week, to seventeen occurring during the fever. No age appears to be exempt; it has been seen in a child of four and in a man of seventy-eight.[5] The great majority of cases, as might be expected, appear in young adults during that period when typhoid fever is most prevalent.

Neither side seems especially susceptible. Both sides have been affected in three cases. In forty-three cases both testicle and epididymis are said to have shared in the inflammation; in thirty-one the testicle alone, in ten the epididymis was involved.[5] These figures do not seem to me very significant, as it is only in recent years that differentiation has been made between processes affecting the epididymis and those affecting the testicle. Even today, we frequently hear of "gonorrhœal orchitis," when epididymitis is the real disease. There still remains to be settled the question whether epididymo-orchitis complicating typhoid is primarily inflammation of the epididymis, as in gonorrhœa, or of the testis, as in mumps.

Thus far we have been dealing with facts. There is much less certainty as regards the cause of epididymo-orchitis, the route by which the infection reaches these parts, and the best treatment thereof. In order to focus the discussion, I wish to present the following case:—

F. G., a naval officer of twenty-three, had always been well, except for measles, mumps and chicken-pox, until August 15, 1911. He had never had any

venereal disease. At the time mentioned, while with the fleet at target practice, he developed an acute appendicitis. He was brought to Boston and a perforated appendix removed. Seven weeks later, when about ready to leave the hospital, he came down with typhoid fever and was discharged well, with negative cultures from urine and stools, on November 28. During the typhoid, at about the third week, he complained of tenderness in the left epididymis for about forty-eight hours. At the end of that time, the pain left him and did not reappear until three days after his discharge from the hospital, when his attention was directed to a pain in the testicles caused, he thought, by the rubbing of his trousers. The pain, which began in the afternoon, increased so rapidly during the night that at four the next morning I was called to see him by Dr. W. H. Smith.

The patient was a well-built young man, apparently well save for the nausea caused by the intense pain. The scrotum was small and pale and drawn tightly against the pubes by the contracted dartos. The pain was located as much in the left groin as in the scrotum, and was more intense than that of any gonorrhœal infection which I have seen. The contents of the scrotum did not appear to be swollen, but their extreme tenderness made thorough palpation a torture too great to inflict. The temperature was 100 degrees Fahrenheit. He was put to bed, given morphia, the scrotum supported by an Alexander bandage and ice applied.

Six hours later the pain was condiderably less, but the epididymis was definitely swollen and tender. The prostate felt small and soft and was not tender. Temperature was 101 degrees. By the next day the epididymis had become very large and indurated, the testicle remaining normal to palpation. Temperature, 103. Pulse, 116. Urine clear, no shreds,

no albumen. The sediment showed a rare leucocyte. Cultures on plain agar showed numerous colonies of the colon bacillus and micrococci, but no typhoid bacilli were found. Hot poultices and aspirin yielded some relief and the temperature fell to 100 degrees.

This was but temporary. The following day the temperature rose to 104 degrees, the epididymis was if anything more swollen, the scrotum red and œdematous.

Dr. Hugh Cabot was called in consultation and operation agreed upon. It was performed under ether by Dr. Cabot. Through a two-inch vertical incision on the anterior aspect of the left scrotum the testicle and epididymis were delivered. There was a small amount of free fluid within the tunica, and a gelatinous exudate covered the testicle. The epididymis was enlarged to four or five times its normal girth, was tense and hard, and in color a reddish-purple. The testicle was of normal size, and in its upper two-thirds, of normal color. The lowest third, which was separated from the upper portion by a sharp line of demarcation, was slightly swollen and of a darker color. A nick was made through the tunica albuginea of this part of the testis; the underlying tissue was dry and did not bleed. There seemed to be nothing to do for the testicle.

The epididymis, however, was punctured repeatedly with the point of the knife. No pus was obtained, but the serous fluid which oozed from the punctures was collected on a bit of sponge and dropped into a flask of sterile bouillon. This flask, after incubation, showed a pure culture of the typhoid bacillus. Curiously enough, these were agglutinated when examined, a phenomenon which the pathologist, Dr. Oscar Richardson, attributed to the agglutinizing property of the small amount of blood which was also taken up by the sponge.

The testicle and epididymis were then replaced in the scrotum, a piece of rubber tissue laid along the epididymis, and the wound closed to the wick. An Alexander bandage was applied and the icebag continued.

Following the operation the temperature fell to normal, and with the exception of a slight rise the next afternoon, remained so. The pain was much relieved, although not so completely as after the same operation in epididymitis due to gonorrhœa. In two days the swelling of the epididymis and scrotum had decreased so much that I removed the drain. It would have been better, I believe, to have left it in a few days more. The wound healed kindly, however, and except for a constant but not severe pain the condition improved rapidly,

Eighteen days after operation a fluctuant, mildly reddened area the size of a dime, developed in the anterior wall of the scrotum, over the testicle. This was incised, but instead of the pus we expected, we found only some necrotic testicular tissue. This removed, the pain disappeared entirely and the cavity promptly healed.

Twelve days later a similar area appeared in the line of the scar. This opened spontaneously, discharged a little, then healed. Since then the induration of the epididymis has steadily decreased, and when I last saw the patient about the first of March, three months after his acute attack began, there remained only a little thickening to tell the story. Testicular sensation was present and the testicle felt in no way different from its fellow.

During this sickness, the urine had remained clear and free from albumin. Hexamethylenamin was given, at times forty grains a day. Four cultures of the urine were made; one showed typhoid bacilli, another micrococci, the others were negative.

There was at no time any urethral discharge, and only slight frequency and irritation. The prostate remained normal to palpation, although the vesicle on the affected side became moderately indurated.

This case presents three features of interest which may add to our knowledge of epididymo-orchitis. They concern its etiology, its pathology and its treatment.

The inflammation of the contents of the scrotum without a coincident prostatitis seems to me to point conclusively to a blood-borne infection. In this case, the bacilli may have been latent in the epididymis since the first attack, only to become aroused by the trauma and congestion due to walking. Belfield [6] has demonstrated the excretory function of the epididymis; Girode has shown that the suppuration is between, not within, the canaliculi [7]; typhoid bacilli have been found in the otherwise normal testicles and epididymes of persons dead of typhoid fever. The tubercle bacillus also may be desposited in this organ. In every one of those cases of epididymitis, which are certainly due to extension from the urethra, the prostate has, sooner or later, in my experience, shown inflammatory changes. Such changes in the mucous membrane of the prostatic urethra may spread to the epididymis through the vas, but not without spreading at the same time along all the mucosa-lined channels which open out of the urethra. When this occurs, there are definite, corresponding signs and symptoms; the irritation of the bladder neck, the increase in size of the prostate, the induration of that gland perceptible on rectal palpation. The mere fact that urine laden with bacteria flows over the entrance of the ejaculatory ducts seems to me an insufficient basis for the theory of infection by way of the vas; unless there is posterior urethritis and prostatitis coincident with the epididymitis, the

source of this epididymitis cannot be urethral. In this case, however, such changes never appeared; the only sign of infection in this region was the induration of the vesicle on the affected side appearing late in the disease.

The involvement of the testicle I can explain only on the theory that the dry necrosis of its lower pole was caused by the occlusion of its arterial supply. The human testicle is divided into incomplete lobules, each of which is nourished by terminal branches from the capsular artery.[1] This vessel, a branch of the spermatic, pierces the tunica albuginea close to the epididymis. If it is shut off, the only channel by which nourishment can reach the testicle is through the little vessels which run between the globus major and the upper pole; should this occur, the upper part of the testicle stands the best chance. It is my belief that the necrosis of the lower part of this testicle was due to the occlusion of the capsular artery, perhaps by pressure from the swollen epididymis, or by infection from the same source. As support to this view, Dr. J. D. Barney tells me of two cases of acute epididymitis in which he found at operation the lower half of the testicle cleanly sloughed off.

The third point of interest concerns the operative treatment. I have not seen in the literature any report of operation on these cases, except the incision of a focus of suppuration. Suppuration occurred, according to Beardsley, in twenty-two out of one hundred and two cases.[5] The case reported in this paper was certainly getting progressively worse, and bade fair to end with complete destruction of the testicle and its appendages. Epididymotomy, much as it is described by Hagner, was followed by marked relief of pain, by a permanent fall of temperature and by a prompt subsidence of the acute inflammation, with the restoration within three months, of an apparently useful testicle.

Bibliography.

1. Pike: American Jour. of Dermatology and Genito-Uirnary Diseases, Vol. XV, p. 302.

2. Eshner: Phila. Med. Journal, 1898, Vol. I, p. 949.

3. Kinnicutt: Medical Record, 1901, Vol. LIX, p. 801.

4. Blumenfeld: Thèse de Paris, 1905.

5. Beardsley: J. A. M. A., Vol. L, p. 1014.

6. Belfield: Transactions American Urological Ass'n, 1911.

7. Keen: The Surgical Complications of Typhoid Fever, 1898.

8. Hill: Am. Jour. Anatomy, Vol. VI, p. 440. — Also: Osler, Modern Medicine, Vol. II, pp. 166; Osler, Practise of Medicine, p. 89.

THE TIME FOR PROSTATECTOMY.

BENJAMIN TENNEY,
BOSTON, MASS.

Prostatectomy successfully performed does away with one of the great terrors of man's old age. The mortality is already low, not over five per cent in the hands of careful men working under good conditions, and the results are becoming more satisfactory to patients as operators learn to avoid the post operative fistulæ and incontinence which often followed the eariler attempts on the gland.

In the first place this paper deals with prostatic obstruction and only incidentally with prostatic hypertrophy. I have cauterized through an open tube a median projection which was causing complete obstruction in a man of forty-one and given him perfect and lasting relief, and I have enucleated a prostate weighing 248 gm. from a man of sixty-nine, who had not used a catheter more than a dozen times. We may find general hypertrophy of the prostate with very little obstruction and complete obstruction with very little hypertrophy, but obstruction always produces symptoms which can be grouped to mark off four different stages in the disease.

The symptoms of the first stage resemble those of stricture, in the difficulty or slowness of starting the urine, the loss of speed and force in the stream, and a second flow of urine if the patient sits for a time after the first urination. Occasionally when the first hypertrophy appears in the postatic urethra well down

towards the verumontanum the patient may complain of imperative urination and some leakage. Pain is not common. These symptoms are often disregarded by the patient, or if noticed they are considered as one of the necessary evils of life beyond fifty, and he seldom comes to our clinics or offices to complain of them though he may reassure himself as to the condition of his kidneys by having his urine examined. If such a patient be examined a moderate sized sound will be a little tight in the prostate, the urinary distance will be increased, there will be thirty cubic centimeters or more or residual urine, the comfortable capacity of the bladder will be slightly below normal, and the cystoscope may find the internal meatus raised a little at some part, and more or less prominent muscle ridges in the bladder wall.

So far, whatever changes have taken place have been compensated for. The bladder muscle has grown in strength with its growing labor. So long as the patient remains in this state he is not very uncomfortable and there is no reason to think that such a degree of prostatic obstruction will cause any changes in the kidneys or general health.

It seems to me that we do not yet know enough about the growth of hypertrophies in the prostate to advise radical treatment at this stage, but if it should be demonstrated that the group of nodules which produce these mild symptoms are the very ones and the only ones which we find grown large in the later stage of the disease it will alter the picture. Some pathologists in their description of hypertrophies in the prostate and their insistance that our enucleations are not complete prostatectomies, seem to hint at this, but more facts are needed before one accepts such a conclusion for all cases. The nodule which is single and intra-urethral can and should be removed when it causes the annoyance and embarrassment of imperative urination, whether another is expected

to grow or not. As to the other cases I do not believe that any radical surgical treatment is called for at this time, but I do believe that they should be looked over at least twice a year by a competent man, so that the progress of the disease may be watched and stopped at the most opportune time. If one case of prostatic hypertrophy in six is carcinomatous we ought not to dismiss any of them without a clear understanding and a warning to return with any increase of symptoms.

In the second stage of the disease the daily calls to urinate grow more frequent and the patient is wakened once or more at night. If he be unable to urinate when the desire comes on he may suffer intense pain and be unable to urinate when opportunity offers, or only drop by drop. Examination at this time will find residual urine to the amount of 50 c.c. or more, and a much diminished bladder capacity with an increase in the urinary distance. At the same time the urine may be clear and practically free of cellular elements. Cystoscopic examination will find a trabeculated bladder and a deformed prostate.

Tabetics may present the same symptoms without so much diminution of the bladder capacity, but the removal of a prostatic obstruction from a tabetic is as well worth while as from another man and has given great relief to a recent patient of mine.

This stage of the disease seems to me the most desirable for operation, for the following reasons:

(1) There is no hope of spontaneous improvement and every probability that conditions will grow worse.

(2) The kidneys have suffered little or none from back pressure.

(3) The bladder is still ahead of the bacterial invasion.

(4) The amount of material to be removed is less than it will be later and the risk of bleeding is possibly less.

(5) If the hypertrophy be benign it guarantees the patient against the pain and risks of catheter life and sepsis.

(6) If the hypertrophy be malignant it is the early operation which gives the patient the best chance for complete removal.

(7) In some cases it will permit of the "ideal prostatectomy," which is an operation completed at one sitting, without drainage other than urethral, and with the bladder tightly closed. I have had the pleasure of doing this twice, both by the suprapubic route. One patient left the hospital on the eighth day and the other on the ninth, both emptying their bladders normally. Their convalescence was like that of an interval appendix case.

(8) The patient is younger than he will ever be again and there is a steady increase in the morality rate with each decade from forty on. In 1906 Dr. Henry M. Chase and I worked this out on a collection of eight hundred and sixteen operated cases, and the table is reproduced here from the Journal of the American Medical Association.

Age.	Cases.	Morality per cent.
39 — 49	8	0.
49 — 59	120	5.8
59 — 69	422	9.5
69 — 79	240	15.
79 — 89	24	33.
89 +	2	50.

Against this early operation we have only the slowness of the profession in general to advise surgical interference before life becomes impossible without it. Our patients are more ready to accept a surgical cure than their physicians are to advise it.

The third stage usually begins when the patient acquires the catheter habit, though the fourth or septic stage may precede it. The catheter serves a man

with prostatic obstruction as a truss serves a man with hernia. Both are time-honored expedients for avoiding surgical operations which were at first unknown, until recently both uncertain and dangerous, and which are now successful and safe under the best conditions. The catheter usually brings improvement and some relief from the discomforts and disabilities of the second stage and at first there is a condition of comparative ease.

Long life and a catheter are not incompatible. One of my patients began at fifty-six and used it up to eighty-three without great physical discomfort and with only occasional attacks of acute infection, possibly one or two a year. Another patient of eighty-one is trailed by a nurse wherever he goes and catheterized about once in three hours. He has had recurrent phosphatic stones crushed, which it seems reasonable to think he might have escaped, as well as the discomfort and annoyance of his present situation, had a prostatectomy and stone removal been done instead of his first lithotrity.

On the other hand a patient of eighty-four who had never used a catheter was taken with acute retention and hematuria, promptly operated and back at his work as head of a big school in five weeks. A relative of his appeared at the age of eighty, who had used a catheter at intervals for five years. He had hematuria and pyuria, a small phosphatic stone, a large intravesical prostate and so much spasmodic pain that he would have welcomed death as a relief at times. He was also operated with complete success. We can all multiply these examples many times.

The catheter habit is a hard one to break off so long as its slave is comfortable. No medical argument or lurid picture of future danger has had half the influence over the victim that a few hours of real pain have. A constant hematuria does not disturb him

nearly so much as the painful necessity of passing the catheter every hour.

Clean cases in the catheter class are more pressing because older than those who have not reached this condition. If a man can stand the continuous trauma of a catheter he can stand the trauma of an enucleation. If he bleeds to death it is the fault of the operator or the after-case. If he die of uremia he was uremic and not properly prepared before the operation, or there was some slip in the after-treatment, and when our conservative brethren will tell us how to prevent the aged from dying of cerebral and pulmonary disease without operation we can stop the post-operative mortality from these causes.

Unfortunately most prostatic obstruction cases are kept from seeking operative relief until they have exhausted the resources of the catheter and are more or less septic. When they present themselves for examination they have infected bladders, they are debilitated by suffering, toxemia, and often by loss of blood and secondary changes in their kidneys. Operating on such cases is like operating on suppurating gall bladders and appendices. The patient has not only to recover from the operation but from the condition which led to the operation — often a more serious matter.

The fact that most patients can be relieved of their obstruction and recover even if old and feeble, with noisy heart and albuminous urine, provided their preparation, operation, and after-care are correct and painstaking, is a poor argument for delay if more would recover if operated early.

It is the constant cry in abdominal surgery: "Give us the cases early and we will show better results." That same cry should be taken up by men interested in urology and the results will justify our attempt to educate the rest of the profession.

CONCLUSIONS DRAWN FROM ONE HUNDRED PROSTATECTOMIES.

OLIVER C. SMITH,
HARTFORD, CONN.

In presenting this series of one hundred prostatectomies which have been performed during the years from 1902 to 1912, I shall not hope to offer original methods of technique, but shall endeavor to make plain the causes of our failures and fatalities, and to state methods which I believe have brought greater safety and better results.

In relation to the etiology of the senile prostate, I conclude from the histories in this series that Neisserian infection and chronic urethritis are factors of comparatively rare incidence, rather than predominating, as earlier literature would lead us to believe. As to spheres of life and occupational incidence, I feel that no definite conclusions can be drawn. Our patients have come, as a rule, from the upper walks of life, have included a number of professional men of comparatively sedentary habits, and a number of farmers, a few mechanics, but no laborers in the usual acceptance of the term. This may be largely due to the fact that this class do not live to the age incidence of prostatic disease. The pathology of the prostates removed shows at least sixteen per cent to have been malignant, this series including one sarcoma, and two per cent to have been tubercular. The balance, or eighty-two per cent, have been benign growths, the increase in glandular, muscular, and

fibrous tissue varying greatly in different specimens. A few of the earlier cases, which looked benign, escaped critical microscopic examination. Undoubtedly more thorough pathological work would have given a somewhat higher percentage of malignancies.

This series of cases may be conveniently divided into four sub-series of twenty-five each, these divisions marking changes in technique and advances in preliminary preparations and post-operative treatment, and the wiser selection of operative risks. The first twenty-five cases were performed through a median perineal incision, the prostate being drawn down by the rubber tractor of Parker Sims. Practically all the cases were in the third stage of the disease, that is, either suffering from complete obstruction and sepsis, or from the terminal conditions of hemorrhage, urinary extravasation, pyelitis, cardiovascular changes, emaciation, and failing health. No one at that early time considered an operation except as a last resort, and the patient who was willing to be operated upon had to be accommodated from stress of circumstances, regardless of the operative hazard. Nearly all were tried upon catheter life, where such was possible. For this series of twenty-five, the fatalities attributable to operation were four, three of the four deaths being due to post-operative pneumonia, and one to intestinal infection. The operations were frequently performed in emergency at the homes of the patients, in some instances in remote regions. The rectum was injured twice during this series, an accident which has not occurred during the following seventy-five cases. Stones were left in the bladder or formed soon after operation in two cases. Epididymitis occurred in fifteen per cent. Of these twenty-five cases operated upon between eight and ten years ago, fifty per cent are still living, a number of them over eighty years of age.

The second series of twenty-five were performed by the perineal route, by the dissecting method of Dr. Young: the inverted V incision, traction upon the bladder neck by the metal tractor, division of the central tendon of the perineum and recto-urethralis muscle, and exposure to view of the prostate during enucleation. The mortality attributable to operation for this series was six, one death being from pneumonia, one from cerebral effusion, one from cardiac failure, one from septicemia from urinary infiltration, one from shock and hemorrhage and one from anuria. To the after-treatment was added forced water drinking, the earlier removal of the drainage tube, continuous irrigations for a varying period in the cases of badly infected bladders, and the patients out of bed at an earlier date.

The third series of twenty-five were performed by the perineal route without the use of a bladder tractor, and by the median perineal incision and digital enucleation with the ungloved finger. The prostate was depressed by hand pressure above the pubis, and it rarely happened that the enucleation could not be successfully made. The operation is quicker, there is less dissecting and less trauma from the use of retractors. But one death occurred, and that was due to a remote cause. Cystoscopy was performed on a number of cases to determine the condition of the bladder mucosa, the presence or absence of stones and the appearance of the intravesical portion of the prostate. Cryoscopy was employed a few times to determine renal efficiency.

During this series we adopted a more thorough technique in hemostasis. The vesical neck was drawn down with forceps and firm tamponing with gauze strips out of hot glutol solution was employed. These were removed and others introduced, each being allowed to remain a few moments. When a dry field

was procured iodoform gauze packing was introduced around the drainage tube and removed on the third or fourth day. Two hemorrhages followed removal of gauze. After this experience we saturated the gauze packing with oil introduced through the urethra and into the wound a day before its removal. In three instances the bladder was drained by catheter through the penile urethra, the vesical neck and wound cavity being tightly packed. One death occurred in this series, caused by pulmonary embolism, one week following operation.

The more frequent use of the cystoscope, revealing the intravesical location of the prostatic growth, led us to employ the suprapubic route in four of the third series and sixteen of the last series. One realizes, when examining the bladder through this incision, to what an extent the meatus internus is elevated and the base of the bladder heaped up, cone-shaped, around the enlarged prostate, in some instances nearly to the anterior wall, and the amount of traction force that is necessary to pull the field into a perineal incision. Twice in our work the metal tractor was drawn through the vesical neck. In these twenty suprapubic operations, no death referable to the operation has occurred. The technique of the suprapubic operation has consisted in Trendelenburg's position, a 6 to 8 cm. incision above the pubis, avoiding the peritoneum, opening the bladder rather high upon the anterior wall. Retraction of the bladder incision has been avoided unless the exploring finger discovered conditions which required vision. Three times papillomata have been dealt with, and once a fibroid growth of the anterior bladder wall was removed. In four of these suprapubic operations stones have been found and removed, some of which might have been overlooked by the perineal route. In the earlier cases I incised the

bladder mucosa; later the prostatic removal was accomplished by dilatation of the internal meatus and enucleation from within the urethra, commencing at the base of each lobe. An assistant's finger in the rectum pressed the prostate upward and served as a guide. In no instance has the rectum been injured nor has any serious hemorrhage occurred either at the time of or following the operation. Temporary packing with hot glutol gauze, as in the perineal route, has been employed. Closure has been accomplished by more or less inversion of the bladder wall around the drainage tube, the suture of catgut penetrating all coats but the mucosa. The abdominal wall is closed by tier sutures with careful obliteration of dead spaces. Siphonage has been employed a few times but not as routine, for the leakage around the tube is insignificant. Drainage is usually satisfactory, although not favored by gravity as in the perineal incision. Patients are bolstered up on the second day, and if strength permits, are out of bed by the end of the first week. If clots have ceased to form and the urine is fairly clear the tube is withdrawn at this time. Complete closure of the bladder wall, if infection and hemorrhage are slight, with urethral catheter drainage has been employed once, and in exceptional cases may be the method of choice in future work.

Anesthesia. Ether by the closed method was used in our first series; later, ether by the drop method, which we still employ. Later, in bad risks, nitrous oxide-oxygen by the Teter apparatus, and at present gas-oxygen-ether, by the apparatus of Gatch, which we have now used for two years with great satisfaction. In a few cases of great hazard local cocaine or alypin and adrenal infiltration, supplemented by gas-oxygen or ether has been used. Spinal anesthesia was employed twice.

The immediate and remote results have steadily

improved during the last fifty cases, but two fatalities having occurred, giving a mortality of four per cent, one from cardiac and one from pulmonary embolism. None have died from shock or hemorrhage. Considering the sixteen malignant cases separately, two deaths occurred as an immediate result of operation, sixteen and two-thirds per cent. The remote results have been as good as late operations for cancer of other internal organs, unless it is growths of the large intestine. The fact that such a large percentage of prostatic growths are now known to be malignant is a strong inducement for earlier operation. Four of this series of sixteen are living, and at work, at periods varying from three to four years.

The remote causes of fatalities, pneumonia, nephritis, renal infection, pulmonary and cardiac embolism, are more difficult to guard against and must necessarily, from the general status of the patients, the nature of the lesion and the operation, which leaves open vascular channels, remain a menace to all radical prostatic operations. The measures that make for greater safety are, — first, a critical examination of the patient, including the cardio-vascular, respiratory and nervous systems; blood pressure observations, ascertaining the hemoglobin, the determination of the renal function, preferably by the phenolsulphonephthalein test of Geraghty and Rowntree, and the careful elimination of malignant or other serious conditions which make even a prostatic obstruction of secondary importance; second, insisting upon a period of rest and treatment for these various conditions until the contra-indications are less pronounced; third, in the severe emergencies of sepsis and obstruction by conservative cystostomy either by the perineal or suprapubic route, preferably the former, and biding the time when a radical operation may be more safely undertaken, as emphasized by

Chetwood and Willy Meyer; fourth, by selecting the safest and best methods of anesthesia, by administering the smallest amount possible to secure results and that by a trained and skilled anesthetist; fifth, by performing these operations and providing after-care in a well equipped hospital, where every contingency is provided for, and preferably where one is accustomed to work, assisted by associates, nurses and orderlies trained in this special line of surgery; to do otherwise is unfair to operator and patient, and must greatly enhance the immediate and remote dangers; sixth, to state definite details of after-care, to provide prompt and efficient treatment for hemorrhage, shock, anuria, pain, and obstruction to drainage. The lack of these precautions and methods has been responsible for most of our immediate fatalities.

In comparing the indications for and the advantages of the upper or lower route, we find that a low-lying prostate, in a fleshy subject, had better be removed by the former, and that a high prostate in a thin subject should be removed by the latter. Rectal, bimanual and cystoscopic examination will determine the situation of the prostatic growth. The advantages of the perineal route are the superior drainage, the avoidance of infection of the abdominal wall and peritoneal cavity, the more prompt healing of the wound and the visual control of the enucleation in the Young operation. The advantages of the suprapubic route are the more thorough examination of the bladder, the facility of dealing with calculi and growths, less frequent post-operative epididymitis, and the better functional results, especially in regard to complete continence. Where so many factors are involved, favoring one route or the other, careful decision and good judgment are required. One should be equally prepared to adopt the better route in each case.

From this series, considered in connection with the reports from other workers in this field, one must admit that the progress in prostatic surgery has been marked and gratifying, and that at present much of the dread and danger of the operation as at first performed has been eliminated and that the former occasional brilliant result should now be the rule.

I have been ably assisted from the first in the great majority of these operations by my associate, Dr. George N. Bell, eight of this series having been performed by him. We have been fortunate in having the services of a skilled anesthetist, Dr. Orin R. Witter, in a number of the last seventy-five cases. The pathological work has been performed by Dr. Walter R. Steiner, Dr. O. R. Witter and Dr. H. C. Russ. Many of the cystoscopic and renal function tests have been made by Dr. Charles S. Stern and Dr. Thomas N. Hepburn, to all of whom I wish to express my grateful appreciation.

Number.	Name.	Occupation.	Age.	Duration of Symptoms. Yrs.	Stage.	Complications.	Date of Operation.	Anesthesia.	Method of Route.	Result. Immediate.	Result. Final.	Result. Lapse.	Cause of Death.	Nature of Disease.	Remarks.
1	W. A.	Farmhand	56	1½	3	Sepsis-sclerosis	6/02	Ether (closed method)	Perineal	lived	Living; after 3 yrs. still some incontinence	10 yrs.		Benign	
2	S. C.	Farmer	78	2	3	Sepsis-sclerosis	8/02	Local	Perineal	died	1 week		Pneumonia	Not determined	Extremely bad surgical risk
3	M. K.	Farmer	61	1½	2	48 hours retention, alcoholic	9/02	Ether (closed method)	Perineal	lived	Living; reoperation in 2 yrs., small obstructing lobe. Recovery	9½ yrs.		Benign	
4	D. M.	Mechanic	69	12	2	Lacerated urethra-hemorrhage, cardio-vascular sclerosis	10/02	"	Perineal	lived	Lived	2 yrs.	Pneumonia	Not determined	
5	W. S.	Mechanic	66	7	3	Cardiac lesion, complete bladder obstruction	10/02	"	Perineal	lived	Lived	2 yrs.	Apoplexy	Probably benign	
6	G. B.	Farmer	63	2	2	Arterial sclerosis	12/02	"	Perineal	lived	Living	9 yrs.		Benign	Good condition.
7	G. R.	Clerical work	69	2½	3	Pyelitis	3/03	"	Perineal	lived	Lived	2 mos.	Septicemia	Not determined	Pyelitis unrelieved; pyonephrosis and septicemia developed
8	M. F.	Farmer	70	1	2	Intestinal intoxication	3/03	"	Perineal	died	5 days		Intestinal infection	Not determined	Intestional infection preceded operation
9	Y. W.	Statesman	75	4	3	Complete obstruction, chronic gastric ulcer	6/03	"	Perineal	lived	Living, perfect control	9 yrs.		Benign	Bladder function still perfect at 84
10	G. G.	Merchant	73	1	3	Hemorrhage-sepsis	7/03	"	Perineal	lived	Lived	9 mos.	Carcinomatosis	Carcinoma	Recurrence and metastasis
11	— H.	Mechanic	65	1½	2	Cachectic	7/03	"	Perineal	lived	Lived	1 yr.	Carcinomatosis	Carcinoma	Lung metastasis

Number.	Name.	Occupation.	Age.	Duration of Symptoms. Yrs.	Stage.	Complications.	Date of Operation.	Anesthesia.	Method of Route.	Result. Immediate.	Result. Final.	Result. Lapse.	Cause of Death.	Nature of Disease.	Remarks.
12	— A.		74	2	3	Sclerosis	7/03	Ether (closed method)	Perineal	lived	Lived	3 yrs.	Carcinomatosis	Carcinoma	Recto-urethral fistula
13	R. E. M.	Manufact.	72	2	2	Morphine habit, arterial and vascular sclerosis	8/03	"	Perineal	lived	Lived	3 yrs.	Carcinomatosis	Carcinoma	Pelvic metastasis
14	A. W. C.		77	9	3	Cardiac asthma	8/03	"	Perineal	lived	Lived	4 yrs.	Carcinomatosis	Adeno-carcinoma	
15	E. L.	Physician	74	2	3	Uremic attacks; hourly catheterization	10/03	"	Perineal	lived	Living, some incontinence	8½ yrs.		Benign	Active, excellent health at 82
16	A. C.	Architect	74	6	3	Septic, confined to bed; arterial sclerosis	7/04	"	Perineal	lived	Living, slight intermittent incontinence	8 yrs. 8 yrs.		Benign	Well and active at 82
17	P. L.	Carpenter	73	1	3	Bronchitis; arterial sclerosis	9/04	"	Perineal	lived	Living, perfect control	7½ yrs. 7½ yrs.		Benign	Well and active at 81
18	J. B.		72	1½	3	Septic	9/04	"	Perineal	died		24 hrs.	Shock-hemorrhage	Adeno-carcinoma	
19	E. S.	Hotel proprietor	75	3	3	Arterial sclerosis, feeble and emaciated	10/04	"	Perineal	lived	Lived	48 hrs.	Anuria and shock	Benign	
20	T. B.	Postmaster	73	3	3	Cardio-vascular sclerosis	3/05	"	Perineal	lived	Living, perfect control	7 yrs.		Benign	
21	C. S.	Clerk	61	2	3	Bladder aspirated, suffering from anuria	3/05	Gas, ether	Perineal	lived	Living, perfect control	7 yrs.		Benign	Living at 68; perfect control
22	J. M.	Farmer	68	2	3	Septic, alcoholic	3/05	Ether (closed method)	Perineal	died	10 days		Lobar pneumonia	Benign	
23	B. B.	Builder	77	2	3	Septic-delirious	3/05	"	Perineal	lived	Lived	5 yrs.	Apoplexy	Benign	Perfect control until time of death
24	A. S. J.	Merchant	78	4	2	Cardio-vascular sclerosis	4/05	"	Perineal	lived	Lived	2 mos.	Angina pectoris	Adeno-carcinoma	Carcinoma of intestines
25	W. P.	Clerical work	75	4	3	Anuria; complete obstruction; cardiac disease	1/06	"	Perineal	lived	Living, perfect control	6 yrs.		Benign	3 yrs. after op. required urethral dilatation; well and active at 82

26	A. S.	Farmer	74	1	3	Extravasation	1/06	Ether (closed method)	Perineal	died	3 days		Septicemia from urinary infiltration	Benign	Emergency, should have been done in two stages
27	F. L.	Mechanic	64	2	3	Septic, very bad	3/06	"	Perineal	died	4 days		Pneumonia	Benign	
28	L. G.	Painter	59	2	3	Lacerated urethra and aspiration	3/06	"	Perineal	lived	Lived	4 yrs.	Carcinomatosis	Carcinoma	
30	R. G.	Farmer	74	6	2		5/06	Gas, ether	Perineal	lived	Living, perfect control	6 yrs.		Benign	
29	J. H.	Mail carrier	55	8	3	Alcoholic	5/06	Ether (closed method)	Perineal	lived	Living, perfect control	6 yrs.		Benign	
31	T. L.	Lawyer	72	1	3	Arterial sclerosis; complete obstruction	5/06	"	Perineal	lived	Living, slight incontinence	6 yrs.		Benign	Marked improvement in health and weight; still well and active at 78
32	McD.	Animal tamer	63	½	3	Pulmonary tuberculosis	6/06	Ether (drop method)	Perineal	lived	Living, perfect control	3 yrs.	Pulmonary hemorrhage	Benign	Was restored to working condition for 3 yrs.
33	G. S.	Statesman	64	5	3	Alcoholic; melancholia; complete obstruction with hemorrhage	9/06	"	Perineal	died	3 days		Shock and hemorrhage	Benign	Emergency, should have been done in two stages
34	W. B.	Engineer	48	2	3	Extravasation; septic, pyelitis	10/06	"	Perineal	lived	Lived	4 wks.	Pyelonephritis	Benign	Death not chargeable to operation
35	L. H.		72	2	3	Cachectic	10/06	"	Perineal	died	3 days		Anuria	Carcinoma	Metastasis
36	H. G.	Farmer	72	3	3	Urethral stricture; feeble invalid; pyelitis left kidney	12/06	"	Perineal	lived	Living, perfect control	5 yrs.		Benign	Living, working daily
37	L. H.	Mechanic	57	3	2		12/06	"	Perineal	lived	Living, perfect control	5½ yrs.		Benign	
38	W. D.	Farmer	52	1	3	Complete obstruction; hemorrhage; sepsis	1/07	"	Perineal	lived	Living, perfect control	5½ yrs.		Benign	
39	J. T.	Florist	76	5	3	Complete obstruction failing vitality; arterial sclerosis	1/07	"	Perineal	lived	Living, perfect control	5½ yrs.		Benign	Actively engaged in business at 87 yrs.
40	W. B.	Veterinary	69	3	2		1/07	"	Perineal	lived	Living, perfect control	5 yrs.		Benign	At work, good condition
41	G. F.	Farmer	62	2	2	Arterial sclerosis; failing health	2/07	"	Perineal	lived	Living, perfect control	5 yrs.		Benign	Active at 67
42	A. H. R.	Farmer	71	4	3	Cardio-pulmonary	4/07	"	Perineal	lived	Lived	3 mos.	Cardiac disease	Benign	
43	H. W.	Druggist	69	12	3	Diabetes; complete obstruction	6/07	"	Perineal	lived	Lived	2 wks.	Diabetic coma	Benign	Catheter 12 yrs.

Number.	Name.	Occupation.	Age.	Duration of Symptoms. Yrs.	Stage.	Complications.	Date of Operation.	Anesthesia.	Method of Route.	Result. Immediate.	Result. Final.	Result. Lapse.	Cause of Death.	Nature of Disease.	Remarks.
44	F. C.	Accountant	72	2	3	Arterial sclerosis; sepsis	6/07	Ether (drop method)	Perineal	lived	Lived	3 mos.	Septicemia	Benign	Local conditions normal
45	F. P.	Lawyer	55	2	3	Frequent retention; constant residual	7/07	"	Perineal	lived	Living, perfect control	5 yrs.		Benign	Actively engaged in practice of law
46	C. I.	Foreman	57	2	3	Tabes; arterial sclerosis	10/07	"	Perineal	died	1 week		Cerebral effusion	Benign	Lesions of nervous and vascular system should have prohibited operation
47	T. B.	Conductor	72	2	3	Alcoholic; cardiovascular	11/07	"	Perineal	died	15 hrs.		Cardiac failure	Benign	Extremely poor risk
48	W. A.	Farmer	68	2	3	Complete obstruction hemorrhage	11/07	"	Perineal	lived	Living, perfect control	4½ yrs.		Benign	
49	G. M.	Clerk	62	14	3		12/07	"	Perineal	lived	Living, perfect control	4½ yrs.		Benign	
50	V. W. (colored)	Jobber	65	3	3	Stricture; obstruction; hemorrhage	12/07	"	Perineal	lived	Living, good result	4½ yrs.		Benign	
51	T. C.	Deputy sheriff	72	3	3	Chronic nephritis; mildly septic	1/08	"	Perineal	lived	Lived	6 mos	Nephritis; apoplexy	Benign	Life prolonged with comparative comfort
52	B. W.	Mechanic	66	1	3	Arterial sclerosis; sepsis; retention	2/08	"	Perineal	lived	Lived	2 mos.	Apoplexy	Benign	
53	B. H.	Broker	76	1½	3	Commencing tabes	2/08	"	Perineal	lived	Living, perfect control for 3 yrs.	4 yrs. 4 yrs.		Benign Benign	
54	A. P.	Merchant	77	2	3	Arterial sclerosis; pyelitis; complete obstruction	2/08	"	Perineal	lived	Lived	3 yrs.	Pneumonia	Benign	
55	H. S.	Pensioner of Civil War	71	2	3	Arterial sclerosis; feeble and broken	3/08	"	Perineal	lived	Living, perfect control	4 yrs.		Benign	Blind and decrepit

56	P. T.	Mechanic	72	2	3	Complete obstruction highly septic; aspiration	3/08	Ether (drop method)	Perineal	lived	Living, perfect control	4 yrs.		Benign	2 stages of op. 2 wks. apart, cystostomy and prostatectomy
57	L. A.	Farmer	66	3	3	Arterial sclerosis	3/08	"	Perineal	died	1 week		Pulmonary embolism	Benign	
58	W. H.		66	6	3	Septic	4/08	"	Perineal	lived	Lived	4 wks.	Septicemia	Sarcoma	2 stage operation
59	F. B.	Farmer	64	7	3	Cachectic	5/08	"	Perineal	lived	Living	4 yrs.		Carcinoma	Metastasis
60	D. M.	Farmer	67	7	3		7/08	"	Perineal	lived	Lived	2 yrs.	Carcinomatosis	Carconima	Metastasis
61	W. B.	Clerical work	36	2	2	Post-Neisserian	7/08	"	Perineal	lived	Living, perfect control	3½ yrs.		Benign	
62	L. L.	Merchant	68	1	2		9/08	"	Perineal	lived	Living	3½ yrs.		Carcinoma	Still living and well
63	P. C.	Farmer	67	5	3		10/08	"	Perineal	lived	Living, perfect control	3½ yrs.		Benign	Well and at work
64	M. A.	Stable-keeper	57	8	2		12/08	"	Perineal	lived	Living, nearly perfect control	3½ yrs.		Benign	
65	L. C.	Grinder	59	6	3	Severe cystitis	12/08	"	Perineal	lived	Living			Benign	
66	— M.		76	5	2		3/09	"	Perineal	lived	Living			Benign	
67	G. W.	Weaver	62	2	3	Septic; obstruction	3/09	"	Perineal	lived	Living	3 yrs.		Carcinoma	Still living and well
68	D. C.	Newsdealer	70	2	3	Septic; bedridden	3/09	"	Perineal	lived	Lived	4 mos.	Carcinomatosis	Carcinoma	Releived by drainage
69	F. S.	Merchant	80	3	3	Arterial sclerosis; systolic heart murmurs; septic bladder; sloughing prostate	7/09	Gas, oxygen	Perineal	lived	Living, perfect control with frequency	3 yrs.		Benign	Small bladder capacity; result good for age and condition
70	C. F.	Physician	67	3	2	Diverticulum of bladder	9/09	Ether (drop method)	Suprapubic	lived	Living, perfect control	2½ yrs. 2½ yrs.		Benign	Diverticulum required prolonged irgation
71	A. M.	Laborer	73		3	Complete obstruction	9/09	Chloroform	Perineal	lived	Living, perfect control			Benign	Good condition
72	W. E.	Farmer	66	4 mos	3	Anemia from hemorrhage; septic bladder	11/09	Gas, oxygen	Perineal	lived	Living, perfect control	2½ yrs.		Benign	
73	J. H.	Mechanic	63	3	3	Urethral laceration; vesical hemorrhage	11/09	Ether (drop method)	Perineal	lived	Living, perfect control	2½ yrs.		Benign	2 stage operation; cystostomy and prostatectomy
74	F. L.	Farmer	53	3	3	Retention; intravesical hemorrhage	2/10	"	Perineal	lived	Living, perfect control	2 yrs.		Benign	Sexual capacity preserved
75	H. E.	Farmer	72	5	3		2/10	1% cocaine, local, gas, oxygen	Perineal	lived	Living, perfect control	2 yrs.		Benign	2 stage operation; cystostomy and prostatec'y

Number.	Name.	Occupation.	Age.	Duration of Symptoms. Yrs.	Stage.	Complications	Date of Operation.	Anesthesia.	Method of Route.	Result. Immediate.	Result. Final.	Result. Lapse.	Cause of Death.	Nature of Disease.	Remarks.
76	W. G.	Pattern maker	74	10	3	Hemorrhagic tendency; septic	2/10	Ether (drop method)	Perineal	lived	Living, perfect control	2 yrs.		Benign	Cystoscopy
77	L. H.	None	83	3	3	Persistent hemorrhage from bladder	2/10	"	Perineal	died	12 hrs.		Hemorrhage	Not determined	Died at distant hospital
78	J. A.	Farmer	70	2	3	Nephritis (chronic)	4/10	Gas, ether	Perineal	died	some wks. later		Nephritis	Benign	
79	F. N.	Factory employee	71	2	3	Arterial sclerosis	12/10	Ether (drop method)	Suprapubic	lived	Living, perfect control	1½ yrs.		Benign	
80	J. L.	Painter	64	8½	2	Emaciation, arterial sclerosis, hemorrhoids	1/11	"	Perineal	lived	Living, slight incontinence	1½ yrs.		Benign	
81	S. B.	Farmer	60	2	2	Intravesical growth	3/11	"	Suprapubic	lived	Living, perfect control	1 yr.		Benign	In good condition
82	E. C.	Farmer	71	2	2		3/11	"	Suprapubic	lived	Living, good control	1 yr.		Benign	Still living, good condition
83	J. A.	Farmer	62	6	3	Lacerated urethra; hemorrhage	4/11	Gas, oxygen	Perineal	lived	Living, perfect control	1 yr.		Benign	In good condition
84	J. B.	Lawyer	62	3	3	Pulmonary tuberculosis	6/11	"	Perineal	lived op. rec. incomplete	Living, partial recovery	10 mos.		Benign	Working regularly; gaining weight
85	A. A.	Farmer	72	2	3	Sclerosis	7/11	Ether (drop method)	Suprapubic	lived	Lived	6 mos.	Apoplexy	Benign	
86	B. M.	Clerk	52	2	2		7/11	"	Suprapubic	lived	Living, perfect control	9 mos.		Benign	At work, in good condition
87	J. L.	Carpenter	76	5	3	Hemorrhage; sepsis	9/11	Gas, ether	Suprapubic	lived	Living, perfect control	7 mos.		Benign	Perfect control; returned to work
88	A. H.	Farmer	70	2	2	Retention; hemorrhage	9/11	"	Suprapubic	lived	Living, perfect control	7 mos.		Benign	Excellent health; returned to business

89	T. H.	Clerk	77	4	3	Chronic gastric ulcer; gastric carcinoma	9/11	Ether (drop method)	Suprapubic	lived	Living, perfect control	7 mos.		Benign	Still suffering from stomach condit'n
90	D. B.	Farmer	76	1	3	Sepsis; retention; hemorrhage; arterial sclerosis	9/11	"	Suprapubic	lived	Living, perfect control	7 mos.		Benign	Gen'l health improved
91	A. W.	Foreman	64	1	2	Pyelitis; chronic cystitis	11/11	"	Suprapubic	lived	Living, slight urinary fistula persists	5 mos.		Benign	Returned to work; health improved
92	W. W.	Pattern maker	58	3	3	Retention; peritonitis from aspiration	11/11	"	Perineal	lived	Living, perfect control	5 mos.		Benign	Resumed occupation; health improved
93	A. C.	Farmer	73	1	2	Feeble heart action; chronic nephritis	11/11	"	Perineal	lived	Living, contraction vesical neck requiring sounds	5 mos.		Benign	Gen'l health improved
94	C. D.	Brickmaker	73	2	3	Complete obstruction	12/11	Gas, oxygen, ether	Perineal partial	lived	Living, good control	4 mos.		Benign	Marked improvement since operation
95	J. M.	Mechanic	72	3	3	Bronchitis; arterial sclerosis	12/11	Gas, ether	Suprapubic	lived	Living, perfect control	4 mos.		Benign	Excellent health
96	J. B.	Lawyer	62	3	3	Pulmonary tuberculosis	1/12	Gas, oxygen, ether	Suprapubic	lived	Living, perfect control	3 mos.		Benign	Resumed law practice; gained 12 lbs.
97	H. F.	Teamster	63	12	2		1/12	Ether (drop method)	Suprapubic	lived	Living, perfect control	3 mos.		Benign	Excellent condition
98	M. S.	Manager	70	2	3	Pyelitis	3/12	Gas, ether	Suprapubic	lived	Living	1 mo.		Benign	General health improved
99	C. B.	Teacher	58	some years	3 3	Retention; hemorrhage; subject to heart attacks	3/12	Ether (drop method)	Suprapubic	died		1 mo.	Probable cardiac embolism	Benign	
100	E. L.	Farmer	70	2			3/12	"	Suprapubic	lived	Living, gaining strength, voiding without catheter	1 mo.		Benign	Too early for ultimate result

A CASE OF UNRELIEVED, UNEXPLAINED VESICAL TENESMUS.

FRANCIS R. HAGNER,
WASHINGTON, D. C.

My reason for reporting this case is the unusual picture it presents. In my experience I have never seen a case comparable to it in the symptoms manifested.

Mr. H. P., age 67, was admitted to Garfield Hospital on October 6, 1911. He had been under Dr. Hardin's care for one week, complaining of frequent urination and great tenesmus. The patient lost a leg during the Civil War; otherwise he had been normal. For five years, however, he had had symptoms of prostatic obstruction. On September 28, the patient had complete retention, relieved for a short time by catheterization, the tenesmus returning after one half hour. The tenesmus and urinary frequency continued, gradually increasing up to my first visit, October 4. When I first catheterized the patient I obtained six ounces of residue urine. The urine contained colon bacilli and a moderate amount of pus. The catherterization relieved his bladder spasm for about twenty minutes — then the tenesmus returned and a catheter reintroduced obtained only a small amount of urine without relief of pain. I have never witnessed such distressing tenesmus as this patient had. He would writhe in agony and hop out of bed on his leg and strain until one would think he would have an apoplectic stroke. Usually when the paroxysm

reached its crisis he would insert his finger into his anus and make forcible pressure of the soft parts on the tuberosity; this he declared invariably afforded him some measure of relief. His bladder capacity was seven ounces. The cystoscopic examination, which was not very painful, revealed a moderately enlarged intravesical prostate, with regular outline; on rectal examination a fairly firm, moderate sized prostate was noted. There was nothing suggestive of malignancy.

I considered the only thing affording relief from his terrible suffering was rest for his bladder, so a perineal section was performed and a drainage tube inserted. As soon as the patient recovered from the anesthetic the tenesmus returned, being as severe as before the operation. He was given full doses of morphia to relieve the tenesmus, which had very little effect. I then thought the presence of the perineal tube in the bladder might be a factor in causing a continuance of the tenesmus, so it was removed, replacing it with a small soft-rubber catheter. His relief was of only thirty minutes duration, tenesmus then returning. The patient spent a most restless night, the spasm occurring every twenty minutes. On the morning of the seventh, I irrigated his bladder with salt solution and removed the catheter, fearing the presence of any foreign body in the bladder might account for the continuance of the spasm. Within a few minutes the tenesmus returned with all its former severity although only a few drams of urine were present in the bladder.

Careful examination showed neither a prevesical or a postvesical infection, as there was a leucocytosis of sixteen thousand, and as the patient was very stout we considered the possibility of not being able to diagnose an infection outside the bladder. As the tenesmus continued in spite of the perineal drain

the only possible resort with promise of relief that I could suggest was through a suprapubic cystotomy. Before doing this, however, Dr. Thomas Charles Martin was called in and a careful rectal examination was made, to learn if any rectal condition could account for the suffering. His examination was negative, so the cystotomy was done, under cocaine anesthesia. The patient was more comfortable for about half an hour, when the tenesmus returned with all its severity.

When I found the suprapubic drainage did not relieve the suffering I removed the suprabubic tube, to be rid of the presence of a foreign body in the bladder. The symptoms, however, were unchanged. The patient died thirty-six hours after the second operation, frightful tenesmus continuing almost to the time of his death.

On admission the patient's temperature was normal, pulse 124, and respiration 24. He was weak, however, and in poor physical condition following the previous week's loss of sleep and his continued suffering. His highest temperature at the hospital was 101, but his pulse gradually increased in frequency. With great difficulty I obtained permission from the family to remove the bladder, rectum and kidneys. The autopsy revealed only a very mild grade of double pyelitis, merely a little reddening of the pelvis; the rectum was absolutely normal, as was the tissue surrounding the bladder. The peritoneal cavity was free of infection or neoplasm. The bladder and prostate presented pictures as described in the examination. Sections through the prostate showed fibro-adenomatous tissue but no malignancy.

When I first saw the case I examined him carefully for some central nervous lesion that might cause this condition, with negative results. The only possible

explanation I can give as a cause for the unrelieved symptoms, is that the septic condition of his bladder produced a toxic neuritis of the nerves supplying that viscus.

This was one of the most trying cases it was ever my experience to treat, and one of the saddest to behold.

POINTS IN PROSTATIC SURGERY.

G. KOLISCHER,
CHICAGO, ILL.

The following remarks will be confined entirely to the suprapubic enucleation of the prostatic gland. I want to emphasize again that I consider it highly advisable to operate through incisions that permit of operating under the guidance of the eye; therefore liberal incision through the skin and through the rectal fascia. The anterior aspect of the bladder is exposed by stripping off the peritoneum. I also recommend a free incision of the bladder wall, for the following reason: exposure of the interior of the viscus enables the operator to amplify and correct his preoperative diagnosis, and permits him to control with his eyesight all the operative steps, so that clean surgical work can be done and post-operative hemorrhage prevented.

The mucosa covering the prostatic region has to be incised; boring through it with the finger is a surgical misdemeanor. Difficulties in finding the right cleavage, or the encountering of a hard small prostatic tumor, call for elevation of the trigonum through rectal insertion of an assistant's fingers, so that if necessary the tumor can be dissected out under guidance of the eye. The prostatic urethra ought to be clipped off as closely as possible to the enucleated tumor. It is of the utmost importance, after the enucleation has been finished, to expose and to revise the incision in the vesical mucosa. Should any bleed-

ing be discovered the guilty vessels are either obliterated by enclosing sutures or by crushing with a Blunck clamp. All the intravesical post-operative hemorrhages that I have observed so far came not out of the prostatic site, but from the edges of the mucosa incision.

I want to call attention to another possible source of post-operative hemorrhage. If the manipulations around and inside the bladder be difficult it will occasionally occur that the frontal part of the bladder becomes detached from the surrounding structures; this incident may lead to the tearing of veins in the retropubic space. Therefore, whenever the bladder becomes detached this retropubic space has to be inspected before closing up, and a discovered hemorrhage has to be properly dealt with.

The post-operative drainage of the bladder ought to be done only suprapubically; the insertion of a permanent catheter inconveniences the patient greatly and is apt to lead up to infection. The incision in the bladder is closed up to an opening that permits of a drainage tube of about twenty-four Charriere. The drainage tube should not touch the bottom of the bladder and is connected by additional tubing with a bottle containing fluid, so as to assure constant siphonage. In order to control the continuity of the column of fluid a rectangularly bent glass tube is inserted between bladder tube and connecting hose. The structures above the bladder are also closed up, save for the suprapubic drainage hole.

Dr. Greensfelder, attending surgeon at the Michael Reese hospital, made a suggestion to me which proved to be very valuable in ensuing primary intention. He is in the habit of adding a layer of sutures to the usual number by seizing the subcutaneous fascia with pincers and uniting it also by interrupted sutures. The sequestration of about one-third of the patient's

blood by tying up the extremities half an hour before and during the entire operation, I must consider as one of the most valuable aids in obtaining superior results.

DISCUSSION

OF PAPERS OF DRS. TENNEY, SMITH, HAGNER AND KOLISCHER.

DR. EUGENE FULLER of New York: I have been very much interested in these papers, especially Dr. Tenney's paper. The only point that I would mention in connection with his paper is the fact that he speaks of the very low mortality between the ages of forty and fifty. As I understand it he was speaking of senile hypertrophy of the prostate. I do not think that I ever saw a senile hypertrophy in a man of forty, but that brings up a point. In so many cases of comparatively young men with prostatic hypertrophy that you hear so much about, who have been subjected to prostatectomy, one cannot but suspect that the diagnosis was at fault. They have probably been operated on for inflammatory conditions which are not true hypertrophy. There was tumefaction there, and this would have probably disappeared if palleative treatment had been employed. In senile hypertrophy tumefaction does not disappear. I recently saw a patient, a man about forty-two, who was taken off the street and run into a general hospital with retention and operated on immediately for prostatic hypertrophy. Everything was gouged out and the man was left with a condition of incontinance and in an extreme condition of pain and discomfort. In making an examination I found an inflammatory condition which had involved everything as far as the hand could reach. The ureter was pinched on the right side by this mass, and he had pyelitic symptoms. His condition was relieved by putting him into the position for seminal vesiculotomy and draining the mass, thus freeing his ureters of compression from the inflammatory exudation. Now he is in a condition of comfort and has fair control of his urine. Dr. Smith in his excellent paper recorded cases much older than forty years. His cases generally corresponded with mine as far as age is concerned.

The shape and size of the prostate seemed to have influenced the doctor as to whether he would use a perineal or a supra-

pubic incision. There is no doubt that if you try to remov an extremely large prostate through the perineum you are more apt to do violence to the neck of the bladder and have more disturbance of vesical control than suprapubically. At the same time, many of these big prostates can be broken up and taken out perineally very well.

A point not brought out is the condition of the bladder in these prostatic cases. If you have a very atonic bladder, very thin, distended and with a great deal of trabeculation, it seems to me you need the maximum amount of drainage and rest before it resumes its function. I think in such a condition it is a great mistake to do a perineal operation, also where you have dilated ureters and the pelvis of the kidney is involved. You need so much drainage that the perineal route is not sufficient; you ought to have suprapubic drainage. In a certain number of cases I have taken the prostate out through the perineal route and then later on made a suprapubic incision for drainage, simply to make sure that I had sufficient drainage.

As to packing, which Dr. Kolischer spoke of, I have not packed the bladder after prostatectomy, for a great many years. I think it is a very poor sort of technique. I can remember when I was fairly young, pulling packing out of the bladder on the third day after prostatectomy. The pain associated with the procedure and the shock following it were both sufficiently marked to make a vivid impression upon me.

DR. BRANSFORD LEWIS of St. Louis: I just wish to speak of one point with reference to the age of the patient. I think that Dr. Fuller has raised quite an important point on this subject: that a good many patients are operated on for the removal of prostates in which the operation is not justified by the actual conditions present, there being in addition to a moderate hypertrophy, considerable congestion and swelling and obstruction from inflammatory processes. But we must not overlook the possibility of hypertrophy occurring in younger life. I am well acquainted with a certain patient who began his symptomatology of definite obstruction when he was thirty-three. He kept it up until he was forty-three, at which time I removed suprapubically his hypertrophied prostate. If you had seen that man go through the contortions he experienced when he tried to urinate, — when the contraction of the bladder would be tremendously forcible and he would get red in the face in an agony of straining in an endeavor to expel the urine. When I made the suprapubic incision there was a great big

hypertrophy, which was removed. The patient recovered and has been well since.

DR. HENRY JACOBSON of St. Louis: I remember Dr. Lewis' case, and know the man very well. I want to relate a similar case, and pay especial attention to Dr. Hagner's case. A farmer came to me who gave a history of disturbance of urine up to the age of fourteen. He had wet the bed every night up to that age. After that he developed spasm of the bladder every time he would urinate. In time he could not do his work. He had to give up his farm. He had an enlarged prostate and a colon infection of the bladder. I removed his prostate and found the sphincter of the bladder very much tightened, and so made a good, free incision into the sphincter of the bladder. This man now has to get up only one time at night. His urine has cleared up nicely. He is able to do his work and feels well. He calls every two months for dilitation of the bladder sphincter.

I had one woman patient that had frequency of urination and spasm and I could not find any urinary cause for the spasm. Examining further along the lines laid down by Dr. Cabot yesterday, — that we have to be good diagnosticians outside of the urinary tract as well as along that line, — I found that there was a prolapse of the uterus. A support relieved the spasm and dysuria.

In a third case a woman had slight prolapse, which was relieved for quite a while, with a pessary, and then she developed pyelitis, and the dysuria did not subside until the pyelitis became better.

DR. HUGH H. YOUNG of Baltimore: I apologize for getting into a prostatic discussion again. I wish to say that I am still unshaken in my belief that perineal prostatectomy is the safest operation, but I do not want to get into any polemic on this subject. I am a great believer in every fellow doing what he can do the best. After seeing perineal prostatectomy done abroad, I think unquestionably that suprapubic prostatectomy is the proper operation for them. When you see one go into the perineum apparently oblivious of the fact that there is such a thing as a triangular ligament, an external sphincter or a bulb of the urethra, and simply by brute force drag out a prostate, I think you can realize that any method by which you can avoid doing such destruction to absolutely essential structures should be the operation to do. Of course, everybody knows if you are willing to take the trouble, if you are willing to work

up the anatomy and become acquainted with the anatomical landmarks of the perineum, that it is the simplest thing in the world to go in and expose the prostate perfectly without any injury to the sphincter, bulb or triangular ligament, and that you should never get incontinence. I do not mean to say I have never had incontinence. About a year ago in London, I presented four hundred and fifty cases, and while there was not a single case of absolute incontinence, day and night, there were three cases that did have a partial incontinence in the day time. Those, however, I attribute to my own fault. In two of these cases I cut in front of the transversus perenei muscle and injured the structures of the triangular ligament. In the other case I cannot say what the cause was. Incontinence is certainly no bugbear if the operation is done carefully. At this meeting in London there were a great many reports on prostatectomy. Quite a few reported incontinence after suprapubic operations, but not as frequently, I admit, as after perineal prostatectomy. Incontinence, if either operation is done carefully, ought not to occur.

As to the simplicity of removing a huge adenomatous prostate that projects into the bladder, there is no question it is easier by the suprapubic route. All my earlier prostatectomies were suprapubics, and I did a great many of them a little more quickly than I can now perineally. The only question is whether it is worth while to go to a little more trouble to take a prostate out through the perineum when you are convinced that you can get better results from the patient's standpoint. I am firmly convinced that my patient faces a mortality only about half as great through the perineum, and, that being the case, I feel it is my duty even to struggle a little more and do even the difficult cases through the perineum. I think other people may be perfectly justified in doing the opposite.

Now as to the possibility of removing every prostate through the perineum. I think it is quite well shown you can remove any prostate you want to, if you will take the time and trouble. A good many of you saw a prostatectomy done this morning, and the assertion was made it could not have been done through the perineum. You noticed, perhaps, that all that was removed was the portion projecting into the bladder. Doubtless there was good reason for that, but one might question whether or not in the course of the next year those lateral lobes might not become more enlarged than now and lead to obstruction.

I would like to remark that that case was ideal for the perineal operation. It would have been the easiest thing in the world

to remove the lateral lobes, and no trouble at all to bring that pedunculated portion into one of the lateral cavities and remove it. For large intravesically projecting prostates, the suprapubic operation is easiest, is more quickly done, and is a very good surgical procedure. I have nothing to say against it, but I do not do it myself. For the small prostate, unquestionably the perineal route is always preferable, because it is much easier to get at, you can see what you are doing, and avoid structures which you would otherwise injure. Freyer, who probably has had the greatest experience of all, says that unless a prostate projects into the bladder it should not be removed. We constantly remove prostates by the perineum which do not project into the bladder. Another line of cases which occurs in twenty or twenty-five per cent of cases, is a sclerotic condition around the urethral orifice with a bar present, and in these cases the "punch" operation, which I have suggested, is ideal and infinitely better than a suprapubic or a perineal operation. It must be limited, however, to cases where there is only a bar or contracted sphincter, with no lateral enlargements present, else these lateral lobes are apt to enlarge and obstruct, as will probably happen in the case we saw this morning.

DR. GEORGE K. SWINBURNE of New York: I only want to speak of the prostatic bar or a sesseil obstruction of the middle lobe of the prostate in younger men, and this condition was called to my attention by Dr. Young and by his punch. I have only had three cases, and two of them were perfectly successful. The third case was a man sixty-five years old who presented this picture with the Buerger urethroscope. The prostate was apparently not enlarged by rectal feel, and with the punch the bar was readily removed. It is certainly a very easy operation. The instrument acts practically automatically. You insert the instrument into the bladder, open the window and withdraw it, and it will catch whatever obstruction there is, and as soon as you have cut away all obstructions the instrument will come out into the posterior urethra without catching the internal orifice. Hemorrhage has not been great in these cases. In this case of the man sixty-five, for perhaps a month he emptied his bladder satisfactorily, and then to our astonishment the lateral lobes seemed to project up and he had to have a suprapubic prostatectomy.

The other two cases were younger. One had been under the care of a prominent surgeon here in New York for two years.

He had been instilling silver nitrate into his bladder; just why I do not know. He had eight ounces of residual urine, and a small tumor on the floor of the bladder that obstructed the internal orifice, and the after-results of the operation were completely satisfactory, and the man remained in the hospital only twenty-four hours. He should have remained forty-eight hours, because he got secondary hemorrhage ten days afterwards. He called me up in the evening, and I told him to go to bed, and had his bladder washed out. He made a complete recovery.

The other case was a man who had had urinary obstruction for twelve years. He was forty-nine then, and I found this same condition. It was the first case I had. The clipping off of that has rendered him comfortable ever since. That was done two years ago.

DR. HUGH CABOT of Boston: I hesitated a little to get into this discussion, which involves so many whose experience is far wider than my own. I am still one of those who vacillate from the suprapubic to the perineal route, and get into trouble by both methods, apparently with equal certainty. I am, however, much impressed by the fact that the suprapubic operation carries, and seems to me intrinsically to carry, a higher mortality. I do not believe that it depends upon the technic by which the operation is done. A badly done suprapubic operation carries a higher mortality than one that is well done, but admitting the best operation above or below, I am quite clear that the suprapubic operation has in and of itself a higher mortality. I am impressed by the fact that there is a shock (whatever that may mean) to the suprapubic operation which does not accompany the perineal operation. I think it is more difficult for most of us to manage the bleeding above, though, of course, with experience that undoubtedly becomes a less important factor. On the other hand, the management of bleeding below has not seemed to me difficult after the very elementary principles are understood. It is perfectly clear that the perineal route subjects the patient to more danger of complications in the hands of the inexpert, but that is not, of course, a criticism of the operation, but a criticism of the operator. It is possible to get into more difficulties that leave the patient uncomfortable below than above, which will perhaps balance the higher mortality. The poor operator had better adopt the suprapubic route. He will kill more patients, but those that he gets away with will redound less to his discredit. But that does not, of course, get at the crux of the matter. It is not

our business to discuss the results which are due to our poor work, but the question of which of the operations is best. But admitting all of those things, I am convinced that the suprapubic operation carries a higher mortality, and therefore should be confined to those cases which are better risks, taking the whole picture into account, and to those cases which require long-continued previous drainage, which cannot be obtained through the urethra. I was brought up as a perineal operator. I was brought up in the belief that efficient drainage could be obtained by the urethra. But I do not now believe that to be the case. I believe there are many cases which cannot be efficiently drained by a catheter and which must be drained by a suprapubic opening. If this is true, it brings into the class appropriate for suprapubic operations, some of the very worst cases, some of the very worst risks, but it also diminishes the risk, especially in the two-stage operation. I am quite sure that the two-stage suprapubic operation is less dangerous than that done in one stage upon a patient with poor kidneys. So that, in the class in which the high operation is indicated I would put the cases which are thoroughly good risks and have a prostate projecting into the bladder, and the very bad cases which clearly require independent drainage, which cannot be done through the urethra. For the lower route I should include the bad risks which do not require long drainage and which can be prepared for operation by urethral drainage, and I would require for the perineal operation an expert operator.

DR. J. L. BOEHM of St. Louis: There are three cases that have come under my observation within the last six years somewhat similar to the case reported by Dr. Hagner, and we found them to be due to an infection of the pelvi-rectal spaces. These spaces heretofore have not been universally recognized by proctologists or genito-urinary men. The symptom in all of them was severe vesical tenesmus. Two of the cases were male, and one female. Ejaculation is especially excruciating. One of the cases had gone the rounds of all the proctologists and several genito-urinary men. I referred him to a proctologist who very ably demonstrated — and this work was regarded as pioneer work in proctology — an infection of the pelvi-rectal spaces, which requires complete dissection of the rectum out of its bed, with tubal drainage for several days. It has entirely cured these cases.

A second case came under my observation for tenesmus and excruciating pain on ejaculation. We found the same condition.

A third case is in the hospital at the present time, a woman who had in addition a blind fistula. Excision of the fistula and drainage of these spaces have relieved her.

I think this may account for the leucocytosis sometimes, and also for the high temperature. These spaces are filled with cellular tissue, and you may find a large amount of pus and inflammatory tissue when you cut down on them.

In regard to the paper of Dr. Kolischer and the statements of Dr. Young, I want to say as an amateur that when we observe the work of these two masters we are up in the air. Their work is wonderful. When you leave Baltimore you are imbued with the spirit that perineal prostatectomy is the only thing. When you witness the wonderful work of Dr. Kolischer, with his free incision, stripping off the peritoneum, etc., you come to the conclusion that the suprapubic operation as he does it is certainly the only way. I think the method of Dr. Kolischer in contrast to the work of Freyer should be accentuated. Freyer's work is entirely in the dark, while Dr. Kolishcer's is entirely in the light. There is no need for artificial illumination with the free incision and the trowel retractor, because you get a reflected image of the whole interior of the bladder.

DR. PAUL M. PILCHER of Brooklyn: I was brought up in Dr. Young's school, and we have operated altogether about a hundred cases. The first of those cases were all done by the perineal route, and we were very well satisfied with the results. Later there came to us a series of cases which were far advanced, men of advanced years, with hard arteries and septic conditions of the bladder, and we felt that it was a dangerous thing to put them up in the Trendelenberg posture and keep them there for a protracted period of time, as it was necessary for us to do. It took us at least thirty minutes, sometimes forty-five minutes, to enucleate a prostate thoroughly by that method, and we looked for a method which would reduce the time limit and enable us to remove the prostate in these old men in bad condition with the least amount of time lost and anesthesia given.

Now, we still agree that in those small prostates in men who are young, under sixty-five years of age, nothing could be more ideal than the perineal prostatectomy, if we can carry it out as Dr. Young tells us to. However, when you get a man who is septic, who has a distended bladder, where you cannot pass a catheter into the bladder, and who is in bad shape, we now do the two-stage operation. I believe that the two-step operation is just as efficacious and is even safer than introducing a catheter

for a week and then doing the suprapubic operation at one sitting. We take our old men and under local anesthesia open the bladder, insert a tube and drain the bladder for at least a week. Then after the bladder has been drained, the pressure on the kidneys relieved, the kidney index raised, we anesthetize the patient, and under an anesthetic in from three to eight minutes, through the opening already made, through a wound which has already been subjected to septic influences, we use our finger alone to enucleate the gland. I do not believe in this wide opening up of the bladder, because oftentimes you have a slough and a very mean wound to heal.

As to the time of healing of these wounds: At first it took us a very long while to heal up our suprapubic incisions, and we thought it was a distinct advantage to do the perineal operation. We have found by using this two-step method — making a high incision in the bladder and allowing the tissues to heal around the drainage tube before the enucleation of the prostate, that we can oftentimes secure a complete healing in from eighteen to twenty days after the operation, and I believe that is as good an average result as you can get in any perineal prostatectomy. We have done many perineal prostatectomies and obtained equally good results.

As to closure of the bladder after prostatectomy: I had an unfortunate experience in that in a recent case. I left stay sutures in the bladder wall, intending to close the bladder in twenty-four hours, which I did. I had very little bleeding after the suprapubic enucleation. I closed the bladder and left the catheter in the urethra. It drained nicely for two days, but during the second night the catheter became plugged, the bladder became greatly distended, tore open the space from which the prostate had been removed, and the patient nearly bled to death. It was only after very strenuous efforts that he was brought safely through.

DR. CHARLES E. BARNETT of Fort Wayne, Ind: Abroad the suprapubic operators all claim that they have no fistulæ and no cases of incontinence following prostatectomy. The question of fistula has not been spoken of, and I hope the essayist will say something about that.

Dr. Smith in his paper spoke of getting these cases out of bed early. I would like to know how many of his fatal cases he thinks were brought about by getting up too early and breaking a vessel.

I thoroughly agree with Dr. Young in all he has said.

In regard to Dr. Fuller's advice about the dilated bladder contra-indicating perineal prostatectomy: My biggest bladder prior to prostatectomy was thirty-eight ounces of residual, and that man, in spite of having a carcinomatous prostate, today is as well as he can be. So that is one case where an extensively dilated bladder improved from the perineal operation.

I take exception to the statement that the ejaculatory ducts are saved when the prostate is removed. They may be once in a while, but I think it is time for us to look into this question and see that it surely is a fallacy in the majority of cases.

DR. MARTIN WARE of New York: I feel rather reluctant to inflict myself on this audience. I feel in the position of one carrying coals to Newcastle in dealing with this subject in the presence of an audience composed of so many experts.

I rise to speak mainly upon the paper read by Dr. Tenney, the title being "The Time for Prostatectomy." Most of the discussion has revolved about the question of mortality. That has a very great bearing upon this question of the time of prostatectomy. When you are confronted with a patient you have got to tell him something about the mortality. Before advising this major surgical operation you have got to find a "vital indication" for its performance. If you can do him any good in any other way, it is your duty to do so. The excuse has been offered that we are obliged in many instances for social reasons not to use palliative measures, such as putting a man on the catheter. Everybody is free to admit that many a patient will be able to get along for many years if he is in excellent hands and catheterized regularly. Therefore there is a place for this particular palliative measure.

As to suprapubic drainage: I had a case eighty-two years of age whom I had drained suprapubically and had set the day for removing his prostate, when I was told that he had suddenly collapsed. I declined to do anything further, and he still carries a fistula, enjoying the best of health.

DR. JAMES A. GARDNER of Buffalo: I wish to report a case. Dr. Hagner spoke about his patient being relieved by pressure of his finger in the rectum. I had a case two years ago, which Dr. Bolton Bangs referred to me, who had complete retention and also a colon infection. The Doctor suggested that we should use bladder washes of nitrate of silver and inject some vaccines to see if the the man could not resume control of his bladder. He had a comparatively small prostate. I took care of him for

three or four weeks, when he discovered one day upon trying to empty his bladder that if he inserted his finger in his rectum he was able to do so. He reported that to me, and I rather questioned it in my mind until I had seen it proved. Since that time he has found that he doesn't need a physician, but every time he wants to urinate he touches the place and urinates. I have talked to some of my friends to see if they had heard of similar cases and I am asking for information.

DR. M. LAUTERMAN of Montreal: I was sympathizing with Dr. Hagner while he was reading his paper, because his case recalled one I had in Montreal last summer, which had gone the rounds of several of our best men there without any relief. I tried a little expedient in this case, which afforded complete relief. I put two drachms of orthoform in a six-ounce bottle filled with hot water and shook it so as to dissolve as much as I could of the orthoform, which is comparatively insoluble, and poured this into the bladder. The patient went to sleep and slept for six hours, the first she had had for about two months, as she told me. I have since repeated this procedure several times in acute cystitis, leaving as much fluid in the bladder as the patient was able to hold, and it has given more relief than any procedure I have resorted to in years. I do not know whether orthoform has ever been used in this way or not before. It has been a revelation to me. If any of you gentlemen try it I would be grateful if you would let me know what results you get.

This discussion on prostatic work has, as usual, been most interesting. So many phases of the subject have come up that we could devote the rest of the meeting to it. Dr. Tenney's excellent contribution has brought up several points. One patient he referred to, in which he removed the prostate from a tabetic, was somewhat of a surprise to me. Personally I should hesitate before attempting such a procedure. I am unfortunate enought to have under my care a patient of this kind who was operated by a confrère in this city, and this gentleman's condition is not a happy one. The bladder is paralyzed, and his prostatic condition is not entirely relieved. The base of his bladder has not healed entirely.

I do not think that there is any doubt that this discussion has established one fact, and that is that every case is distinctly a law unto itself, and that every operator, as Dr. Young has emphasized, is a law unto himself, and that the surgeon is certainly justified in resorting only to the procedure that he is

familiar with and consequently best qualified to execute in his patient's interest.

DR. TENNEY: I am going to dodge a certain amount of this discussion by saying again that my paper simply referred to prostatic obstruction, and not to hypertrophy. I will let Drs. Kolischer and Smith take care of the prostatic hypertrophy without obstruction. As far as operating on a tabetic is concerned, my patient was a locomotive engineer, and he had an obstructing mass posterior to the internal meatus — a distinctly obstructing mass. The removal was extremely simple. There was practically no hemorrhage afterwards, the bladder wall was sewed up tight, drainage left down to the bladder wall, and the man was out of bed the next day. There was no leakage, and he went home on the eighth day after the operation. He is a tabetic today; I did not cure his tabes. But where before he was having a lot of pain when he tried to empty his bladder, and what I think of as bladder spasm, he is perfectly comfortable now. He still occasionally has a little leakage if he makes any violent effort. I did that last June, and he was in my office in January, and he certainly was very enthusiastic over the relief he had received from his operation. I do not imagine that a prostate in a tabetic individual should be operated unless there is obstruction. If there is mechanical obstruction to emptying his bladder, I do not know why a tabetic should not be relieved of the mechanical obstruction just the same as any other man, and in fact I think he needs the relief and insurance against catheter cystitis rather more than a normal man.

DR. SMITH: The average age of my cases was seventy-one. There was but one under fifty-five. The tissue in this instance was inflammatory, and not senile enlargement. In the eighty cases performed by the perineal route, one fistula persisted; in the twenty performed by the suprapubic route, one wound is still open, after a lapse of three months.

As regards making a long incision, introducing light, and the entire hand into the bladder, when doing the suprapubic operation, I am inclined to feel that such a course is not always necessary or justifiable. In operating for intravesical tumor, I approve most heartily of the long incision, usually a transperitoneal incision, but in a feeble, elderly man, as small an incision and as little trauma as possible, commensurate with getting a good result, is certainly desirable. One acquires an educated touch in the enucleation of the prostate, as in obstetrics,

where we must diagnose the condition of the cervix and the position of the head by the index finger. I believe the enucleation is frequently performed as readily and safely without the aid of vision.

In comparing the advantages of the two routes, I agree with Dr. Young that the high prostate in a thin subject is well removed from above, and that the low-lying or small fibrous prostate in a fleshy subject is more satisfactorily removed through the perineum.

DR. HAGNER: I am afraid that on account of my loss of voice I talked so poorly that the gentlemen did not understand my case, from the way they have discussed it. Dr. Jacobson mentioned his cases, but they are very different from mine. His cases had tenesums from prostatic obstruction. Mine did too, but his bladder was empty, and yet he had tenesmus. I intended to take this man's prostate out, but he was in no condition for a prostatectomy when I saw him. It was my intention to remove his prostate after he recovered from the tenesmus. I thought possibly it might be one of those cases where the vesical neck is greatly contracted, yet I could get my finger in the urethra at the time of the suprapubic.

Dr. Boehm spoke of the inflammatory condition around the rectum. I suspected that in this case. I could not make out anything myself, and I had Dr. Martin see the case. He is a pioneer in modern rectal surgery, and he could discover nothing. At autopsy we dissected the bladder up from the rectum, and there was no evidence of any inflammatory condition at all.

Dr. Gardner speaks of his case. I have had two or three prostatic cases who when they wanted to urinate would stick their finger into the rectum. In this case of mine I think it was perhaps the third and fourth sacral nerves that he pressed on to relieve the pain.

I want to say one or two words about prostatectomy. Some years ago I did not think there was anything to do but a perineal prostatectomy. I was a close disciple of Dr. Young, and nobody admires his work more than I do. But I have strayed from the path a little recently, and have been doing the suprapubic also. I believe, in large intra-vesical prostates the suprapubic is just as good as the perineal.

I have had a few cases, three I believe, of inability to hold urine after the perineal operation. I have not had any cases of dribbling after suprapubic prostatectomy.

I believe, as Dr. Cabot mentioned, in the two-stage operation. I have had some very grave cases upon which I have done the

two-stage operation, that have recovered, and if the operation had been completed at once I feel sure the outcome would have been different. The bladder is opened under cocaine, a large continuous irrigation tube is inserted, continuous irrigation being kept up from one to six days, depending upon the gravity of the case. I think the continuous irrigation is important, the same as in perineal prostatectomy. I believe Dr. Young's success has been due as much to the continuous irrigation he employs as to anything. When I get these bad cases, whether suprapubic or perineal, if they have a severe infection of the bladder, I put a tube in and keep up continuous irrigation for a week before removing the prostate. I recall one case where a man had sixty-four ounces of residual urine, and on cystoscopy the whole mucous membrane of the bladder was as black as your hat and gangrenous. I kept up irrigation for a week, and he improved; a perineal prostatectomy was done, and he recovered. The man would surely have died if that had been attempted when I first saw him. The two-step operation that Dr. Cabot has mentioned is a mighty important thing, I believe, in suprapubic work. When the first operation is done under cocaine, there is no shock, and at the second operation the prostate can be removed in a few minutes.

There is no question that some of the fibrous prostates cannot be removed suprapubically. I saw Freyer work for an hour and a half, and he did not get it out then.

DR. KOLISCHER: I was glad to see that Dr. Young, inadvertently I suppose, supported me in my views. He told us that there are lots of men who do poor suprapubic work. That is the reason I wrote my paper describing an operation that is a surgical procedure and not a tearing around in the dark. I think it is the duty of specialists to develop methods which can be used by men of average surgical training and average ability. I never doubted the good results of Dr. Young, achieved by his virtuososhiip that I greatly admire; but I know men who can walk upstairs on their hands, but no one would recommend that for general use.

Dr. Pilcher recommended the two-step operation. That is undoubtedly very proper in appropriate cases.

As to the time of healing, I would like to state that a properly conducted suprapubic operation will heal just as shortly as any other, provided it is done right. My average is about three weeks for complete healing.

I have never yet seen in my suprapubic work incontinence or permanent fistula in benign cases. In two cases it took ten

weeks to close up a fistula, but I think it was due to a mistake in using scarlet red in an attempt to hasten epithelialization.

As to mortality, Dr. Cabot said he thinks the mortality of the suprapubic operation is greater. That is true if you go back for years, but if you read, for instance, Freyer's report on his last one hundred cases it shows only three and a half per cent mortality. Freyer's work is, from our point of view, crude, and even so, his mortality is only three and a half per cent.

Dr. Smith objected to large incisions in old men. There is no reason why they should not be just as large in old men as in young men.

As to the preservation of the verumontanum and the ejaculatory ducts, I would like to ask Dr. Barnett to read the publication of Zuckerkandl and Lendorf, in which they show that the ejaculatory ducts are preserved, provided a proper operation is done. He should go to work and urethroscope cases that hvae had a prostatectomy. He will invariably find the verumontanum and the openings of the ejaculatory ducts. The only difference from the normal urethroscopic findings is that the distance from the verumontanum to the internal orifice is shortened. It can be shown in specimens and patients that the central part of the prostatic urethra must have been removed. We find the urethra in the specimen, and the shortening of the urethra after the operation can be demonstrated.

My paper was simply a technical paper, because I am convinced that if we do a suprapubic prostatectomy with the same care as Dr. Young does his perineal one we will get uniformally results that are at least as good as his, without taking the chances of the untoward accidents so often observed in perineal work.

REPORT OF A CASE OF DOUBLE URETER WITH INTRAVESICAL BALLOONING OF ITS LOWER ENDS.

HUGH HAMPTON YOUNG,
BALTIMORE, MD.

On November 9, 1911, a man aged thirty-two (C. A. C., No. 3010) came to me complaining of a slight dull pain in the left side of the abdomen, and of cloudy urine. The history was very indefinite. For many years — almost as long as he could remember — he had had a feeling of discomfort, occasionally slight dull pain in the left half of the abdomen, about opposite the crest of the ileum. There had never been any colicky attacks, although he remembers having passed a gravel when ten years old, but none since. Fourteen years ago he had typhoid fever, and during the same year gonorrhœa, which was followed by a stricture, for which he was treated by passage of sounds for a protracted period.

He does not state when the urine became cloudy, but there has been practically no change in his symptoms for years. There has been very little urinary disturbance. He never has had to arise at night to urinate, but during the day he has to void every two or three hours. Recently he had been having night sweats, and felt reduced in strength and general health, though suffering no definite pain. The act of urination was normal — never any pain at the end of urination.

Examination. The patient is a slender, somewhat pale, but fairly strong looking man. Chest negative. The right kidney is easily palpable, descending two fingers' breadths below the ribs, movable on respiration, smooth, and not tender, not enlarged. The abdomen is negative. The left kidney is apparently negative. On rectal examination the prostate is smooth, but quite indurated and tender, and the secretion obtained by massage contains eighty per cent pus cells. Seminal vesicles negative, rectum negative.

Cystoscopy. No residual urine, bladder capacity normal, slight stricture of pendulous urethra. The right ureter appears normal. On the left side, where the ureter should be, the orifice, about 1 x 2 c.m. in size, of a diverticulum is seen. While the examination was proceeding, a strong desire to urinate, accompanied by straining, came on suddenly and the diverticulum was turned inside out and appeared in the bladder as a globular mass about the size of a small pear, on the inner surface of which a ureteral orifice, small, round in shape, was seen. By waiting for the spasm to disappear, and then increasing the fluid in the bladder, the mass disappeared through the orifice of the diverticulum, carrying with it the ureter. Abdominal pressure on the part of the patient would again cause it to appear in the bladder as above described; in fact the mass could be made to appear or disappear from the baldder at will.

Ureter Catherterization. The right ureter was easily cathetherized and the catheter introduced at least 10 cm. The left ureter could only be catheterized when the tumor mass was in the bladder, and then only by using a small catheter (No. 6). When the catheter was pushed upward the mucous membrane went with it, the intravesical balloon disappearing again, and the distance to which the catheter would go was limited (probably about five cm.).

An examination of the separate urines showed,—

	Right.	Left.
	Clear.	Cloudy. Pus.
Phthalein appeared in	10 minutes.	25 minutes.
First 15 minutes: collection of urine showed amount,	18 c.c.	170 c.c.
	Phthalein 9 %	No phthalein.
Second 15 minutes: collection amount,	12 c.c.	7 c.c.
	Phthalein 2 %	Trace.

Catheter in bladder for the two 15-minute periods showed that phthalein 10 per cent had escaped (supposedly around the catheters).

It was evident that a hydronephrosis was present on both sides — the right being sterile, and the left infected, and the kidney of very low functional value.

Collargol, fifteen per cent, was then injected through each ureter catheter and radiographs taken. These are shown in Fig. 1. As seen here the right renal pelvis appears considerably dilated, and irregular, the ureter slightly dilated from kidney to bladder, and the kidney enlarged. The left kidney and ureter show no shadows, but just above the bladder in the left side of the body pelvis a large fusiform shadow is shown (which was supposed to be the diverticulum — the supposition being that the catheter had slipped out of the ureter and was coiled up in the diverticulum).

Collargol was then injected into the bladder through the cystoscope and the plate shown in Fig. 2 was obtained. This seems to show the bladder and the narrow neck between it and the diverticulum, and I therefore determined to excise the diverticulum, and sew the flap containing the ureter into the lower angle of the vesical wound — as employed by me in another case and described in the Johns Hopkins Hospital Reports, Vol. XXII, 1906.

Operation. This was carried out on December 11, 1911, under nitrous oxid, oxygen and ether anesthesia. As soon as the bladder had been opened suprapubically, a herniated projection of mucous membrane, or intravesical balloon, was found in the region of the right ureter. It measured about one inch in diameter and projected about one and one-half inch into the bladder. Investigation showed that it contained on its inner surface, at a point about one and five tenths cm. from the level of the trigone, the narrowed orifice of a ureter. Into this a filiform was introduced, followed by a dilator, and the dilatation was carried up to No. 20 French with ease. After that a large amount of fluid stained with collargol escaped from the orifice. A ureter catheter was then passed for a distance of 33 cm. before it stopped. Further examination of the intravesical balloon showed on the outer side another ureteral orifice at a point about five mm. from where it joined the level of the bladder wall on the outer side. This orifice was quite normal in appearance, being in the shape of an oval slit, and a large catheter passed into it for a distance of 30 cm. This ureter was not dilated, but the inner ureter was very greatly dilated, forming a pouch two or three inches in diameter, with a very thin wall. It was evident that it comprised practically all of the intravesical balloon referred to above. The dilated ureter is accurately depicted by the radiograph after the injection of collargol, which was supposed to have escaped into the diverticulum, but which in reality lay in the dilated lower portion of the inner left ureter. It is evident that not enough fluid had been injected to completely fill the ureter, as it did not reach above the pelvic brim.

Examination of the right ureter showed that it was normal in appearance, and no difficulty was experienced in passing a No. 7 catheter into it; nothing

further was therefore done to it. After considering the question carefully, I decided to do a form of hernia operation upon the intravesical balloon in the left half of the bladder. The procedure was to consist of an incision of the mucous membrane between the two ureteral orifices, leaving a certain amount of normal mucous membrane immediately around them, and a closure of the bladder musculature between the two ureteral orifices so as to push back the herniated dilated ureter, and then a closure of the mucous membrane over the sutured bladder muscle, thus leaving the two ureteral orifices to come into the bladder at the inferior and superior angles of the sutured wound. No difficulty was experienced in carrying this out with the exception that the wall was found to be so thin that a tear was made into the dilated ureter, and after that it was thought wise to excise a portion of the sac and close it with a purse-string suture, which was done before drawing together the muscular edges of the diverticulum by means of two sutures of heavy chromicized catgut, after which the mucous membrane was easily drawn together by continuous suture of fine chromicized catgut as shown in the illustration. As remarked above, the contracted inner orifice had been dilated largely with a filiform and follower, and the outer orifice seemed to be normal in size. Therefore nothing further was done to either of these two ureters, and when the operation was complete they were found to be at the two angles of the wound at the level with the vesical mucosa and apparently in good position for future function.

Before closing the bladder two ureter catheters were passed into the inner and outer left ureters and brought out through the suprapubic wound for injections of collargol and for X-ray photographs after operation. The suprapubic vesical wound was closed with con-

tinuous suture of catgut, and the recti muscles and skin were brought together with interrupted sutures of silver wire, leaving only a small area at the lower angle of the wound for a small iodoformized gauze drain. The patient stood the operation well, and was in good condition at the end. He was immediately taken to the X-ray room where a large amount of collargol was injected through each of the two ureteral catheters, and immediately an X-ray photograph taken. This is shown in Fig. 3. As shown here some of the collargol has escaped into the suprapubic wound and the silver sutures also show. The outer left ureter is seen slightly dilated near the bladder. Then it is lost sight of until above the crest of the ilium, when it runs upward and outward and terminates in a fusiform dilated pelvis. The inner ureter is also not visible until well above the pelvis, where it is seen thrown into two or more convolutions before joining the much enlarged upper (and inner) pelvis. The kidney is evidently much enlarged. The great dilatation of the lower end of the inner left ureter is plainly seen.

Convalescense. On the day after the operation the patient's temperature arose to 104° and did not again reach normal for a week. During this time he was quite weak, and for a time had nausea and vomiting. The patient voided urine naturally through the penis without the use of a catheter from immediately after the operation. There was only a very small amount of leakage suprapubically, and after a few days this ceased. The patient rapidly improved and was up and about during the second week and left the hospital on the sixteenth day in excellent condition; suprapubic wound healed, voiding urine freely without difficulty and feeling very greatly improved.

Examination showed that the urine was still cloudy, and contained pus and bacilli. The patient was ad-

vised to take urotropin and drink water in abundance, and not to strain, in order to prevent breaking open the hernia operation in the bladder.

Cystoscopic examination performed nineteen days after the operation showed no return of the intravesical balloon. In the region of the wound there was a good deal of swelling and rounded protrusions of mucous membrane. The ureteral orifices could not be seen, but there was no marked intravesical projection, and nothing to suggest the enlarged intravesical herniation or balloon which was seen there before.

On March 1, 1912, the patient returned for examination. He reported that he felt perfectly well; that he had been completely relieved of the dull, uncomfortable, slightly aching pain which he had had in the left half of the abdomen, and said that he voided urine freely without difficulty or pain and felt no discomfort either in the bladder or in the region of the left kidney, and his general health had improved greatly and he had increased in weight and now felt quite strong. The urine was still cloudy and contained pus cells and bacilli.

Rectal examination showed that the prostate was still slightly indurated and there was also slight chronic inflammation of the seminal vesicles. A catheter passed with ease and found no residual urine, and the bladder capacity was large. The cystoscope showed a right ureter which was apparently normal and functionating well, urine emitted being clear. On the left side of the bladder where the operation had been performed for the intravesical balloon, there was no ballooning to be seen, but an irregular scar with one or two prominent bands which traversed the wound. The ureteral orifices could not be definitely made out, but three small irregular depressions in the mucous membrane were seen, which may represent

inner and outer ureteral orifices, and a small fistula between the dilated ureter and the bladder, at the site of which the purse-string suture was placed. Urine was seen to come intermittently from this region, but it was impossible to say definitely just where it came from, and I hesitated to probe around with a ureter catheter for fear that some harm might be done. Even when the patient strained there was no evidence of intravesical balloon formation, as seen before the operation, and it therefore seemed evident that the operation had been entirely satisfactory in curing the defect for which it had been done. It also seemed evident that the drainage from the left kidney was entirely satisfactory, as the patient was entirely without symptoms, and there was no tenderness to be made out in the region of the left kidney or along the course of the ureter.

A cursory review of the literature failed to reveal any similar case.

The unusual points about this case are: the presence of two ureters opening into the bladder through a diverticular orifice; the ability to turn the diverticulum inside out at will; the fact that the diverticulum was composed of a greatly dilated ureter whether turned inside out or not; the freedom from renal symptoms; the plastic or "hernia" operation which was performed.

Fig. 1.

Radiograph after injection of 15 per cent collargol into both ureteral catheters. Dilatation of right ureter and renal pelvis, later demonstrated to be dilated ureter. Collargol not sufficient to reach kidney.

Fig. 2.

Left ureter filled (partially) with collargol. Bladder filled with collargol. Constriction between the two shadows represents the diverticular orifice.

Fig. 3.

Radiograph taken after operation; the two left ureters filled with collargol, showing slight dilatation of outer left ureter just above bladder, and fusiform pelvis or dilated upper end of outer left ureter; great dilatation of lower end of inner left ureter (no shadow of either ureter over sacrum) and convoluted dilated upper end of inner left ureter with great dilatation of inner (upper) left pelvis.

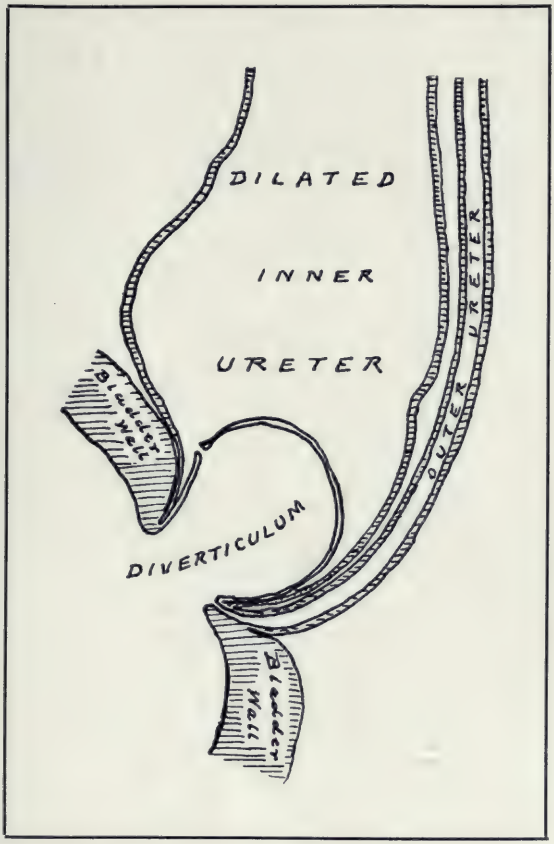


Fig. 4.

Diagram showing condition found at operation.

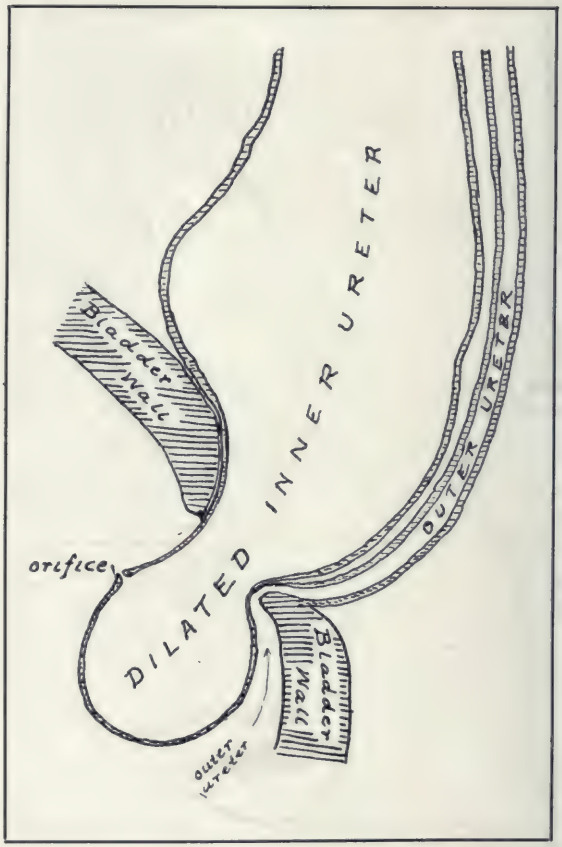


Fig. 5.

Diagram showing intravesical balloon composed of dilated inner ureter with small contracted orifice, and orifice of outer ureter at the outer vesical margin of the diverticulum, the outer ureter being not dilated.

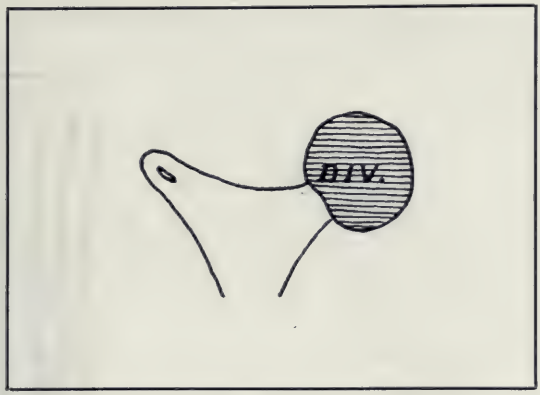


Fig. 6.

Showing orifice of diverticulum at left corner of trigone containing orifice of ureter.

Fig. 7.

Showing the hernia of diverticulum caused by abdominal pressure. I. U., orifice of inner ureter seen with cystoscope. O. U., orifice of outer ureter not discovered until operation performed.

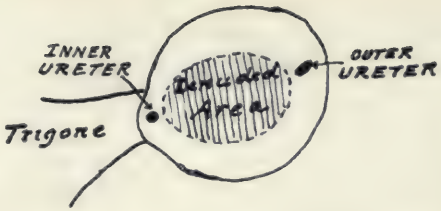


Fig. 8.

Rough diagram showing denuded area made over the most prominent part of the ureteral balloon.

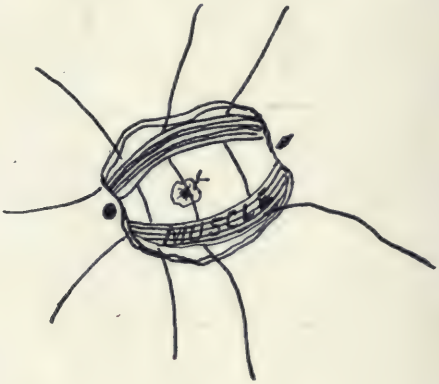


Fig. 9.

Showing the exposure of mass at the margin of the diverticulum placing all sutures to close the opening in the bladder mass between the two ureters.

Fig. 10.

Closure of mass between ureteral orifices.

Fig. 11.

Fig. 11. — Closure of mucous membrane; ureteral orifices now on surface of bladder and both were dilated.

THE REMOVAL OF URETERAL STONE BY CYSTOSCOPIC METHODS.

BRANSFORD LEWIS,
ST. LOUIS, MO.

The methods currently in use for the removal of stone from the ureter are included under the following heads:—

(1) The expectant plan.
(2) The operative plan (by incision).
(3) The cystoscopic plan.

While there is considerable difference of opinion among practitioners as to the relative advantages and possibilities of the expectant and operative plans, there is no doubt that they both receive due consideration in the modern writings on ureteral stone, and are given their meed of praise or condemnation, as viewed by the respective authors. The third plan, however, is not treated with such consideration. Most of the modern contributions on ureteral surgery, both text-books and essays, either fail to mention it altogether or allude to it in such a way as to indicate that it is a feat more or less dubious and untrustworthy; that, although it has been accomplished, it is so improbable as to render it a negligible quantity as a regular procedure.

Thus, Buchanan ("Blocking Stones in the Lower End of the Ureter," Med. Record, March 20, 1909), in advising on the course to be pursued, says: "We must decide that every patient whose condition is not too urgent should be allowed to wash out his own

stone by drinking either distilled water or the water from an appropriate spring. If this treatment should fail, we turn to the operative treatment for relief."

Deaver, in reporting his interesting experience with five cases of ureteral calculi (Surgery, Gynecology and Obstetrics, April, 1906), discusses the application of the two methods, expectant and operative, but does not allude to the cystoscopic. The nearest he comes to it is to say that, "In the female, the urethra can be dilated sufficiently to admit suitable forceps or even the finger (*sic!*), and after slightly incising the vesical orifice of the ureter, the calculus can usually be extracted without much difficulty." It is gratifying to note the evidence of a change of heart in this eminent authority, in his discussion at a later date of Miles Porter's paper on "Kidney and Ureteral Stones" (Jour. of Am. Med. Assn., Nov. 12, 1910, page 1696), when he says: "I make an incision through the linea semilunaris and it is a simple thing to bring up the ureter, but not to get out a stone, especially when it is near the junction of the ureter with the bladder or in the bladder wall. One of the hardest operations I have done lately was one in which I had to remove a stone lodged in the ureteral orifice. I did the suprapubic operation. The operating cystoscope appeals to me strongly."

Keyes (Genito-Urinary Diseases, 1904) makes no mention of cystoscopic methods of removal of ureteral calculi. Greene and Brooks (Diseases of Genito Ur. Organs and Kidneys, 1908) fail to mention them, although they invoke the possibilities of urethro-vesical access in saying (page 296): "Occasionally, operating through the bladder a stone may be removed from the ureter by the finger or by the use of long narrow forceps, if the mouth is, as occasionally happens, dilated."

Morris (Dis. of the Kidney and Ureter, Vol. 2, page 467) apparently gives no countenance to the

cystoscopic plan, but says: "If a calculus is known to be blocking the ureter it ought to be removed without delay by one of the methods of extraperitoneal ureterotomy if it cannot be extracted through the renal pelvis. There is no medicinal treatment which is of any use, or which affords any hope of saving life or the integrity of the kidney when the stone is impacted in and not simply passing down the ureter. On the other hand, extraperitoneal uretero-lithotomy is highly successful, and will probably become almost as uniformly practiced as nephro-lithotomy."

The fact that cystoscopic methods of removal are either held in slight esteem or are treated with studied indifference by many writers of the present day, is apparent.

The question arises, does this represent the deserved status of this method. Is it a nonentity, meriting oblivion, or should it receive the recognition which the history of its use has earned for it — with a just estimate of its limitations and its possibilities? Is it a method of accomplishment, or of theory only? Does it afford advantages, in certain cases of ureter calculus, not possessed by other methods, or is it a failure in all? Is it a menace to the patient, dangerous to his life and liberty, and calculated to deprive him of the chance of recovery, or does it in certain instances offer him the opportunity of relief without the application of a heroic major operation? The people have a right to a decision on the subject.

Bearing on the question, it may be asked whether the other methods are all-sufficient; and if they are innocuous. If not, there is both room and need for the third method, provided it has a modicum of success to justify it. Lester Leonard (Jour. of Am. Med. Assn., Jan. 23, 1909), who has had much experience with ureteral calculi, in championing the cause of the expectant plan declares that "The

results obtained by this course of treatment show that in fifty per cent of the cases of urinary lithiasis presenting marked symptoms, natural forces are capable of expelling the calculus." Granting that this is true, what of the other fifty per cent of the cases? The same author evinces a wholesome respect for the seriousness of open operations in his arguments and allusions to them. He says: "If Nature is capable of expelling these calculi in so many instances, why should these patients incur the grave risks of operation on the ureter? The detection of a small ureteral calculus is not an indication for operation unless urgent symptoms are present, since its size makes it possible, and probable, that Nature will expel it. It is preferable to permit Nature to accomplish the expulsion rather than submit the patient to the risks of operation."

From other sources, possibly less biased by the vocation standpoint, we receive information on the seriousness of cutting operations for ureteral calculus. Deaver mentions that "In one of Freyer's patients the ureter was exposed by incising the vagina, but the stone slipped farther up the ureter and could not be extracted. It was found, however, in the dressings on the following day; but the patient developed pelvic cellulitis, had a very slow convalescence, and when last seen still suffered from kidney symptoms."

Deaver's own experience, as related by himself (*ibid.*) indicates that all is not plain sailing in such work, even in the hands of so expert an operator as he. Referring to Case 3, in which he had opened by lumbar incision, he says: "A stone was located in the vesical end of the ureter close to the bladder wall. After many attempts to dislodge the stone, either into the bladder or by drawing it up into the ureter, all of which were unsuccessful, the wound was covered and the patient placed in the dorsal position

and the bladder opened supra-pubically; the vesical orifice of the ureter was incised slightly, and by pressure from behind the stone was finally brought into view and delivered." Evidently, here was a case in which, although the stone was located "in the vesical end of the ureter," two considerable cutting operations were required to afford access to it and to effect removal. In another case of the same author the symptoms were referred to the left side. Although an X-ray showed a dense shadow in the region of the right kidney, "an oblique incision was made in the left flank; the calculus was found impacted 3 cm. below the pelvis of the left kidney. An effort was made to work the stone up into the pelvis, but failed; the kidney was delivered and an incision was made, horizontal to the poles, into the pelvis, and scoop and forceps were used to deliver the stone, but failed. On palpation, the stone was felt in the previous location; an incision was then made in the long axis of the ureter, over the calculus, and the same delivered. The patient did well for three weeks, when he was seized with severe pain in the right loin, and in a very short time became uremic and died. Autopsy showed an impacted stone in the right ureter." No cystoscopy had been carried out in this case, and the second stone had not been discovered until autopsy. Cystoscopy was evidently needed in this case; and whether capable of removing the stones or not, might have helped much in attaining a complete diagnosis.

A. E. Isaacs (N. Y. Med. Record, June 19, 1909) reports his experience with four cases of ureteral calculus. "The first, a girl of fifteen; symptoms referred to left kidney; cystoscopy and catheterization; right ureter clear, left obstructed near the lower end (at 1¼ inch). First, nephrotomy on left kidney; sound passed down ureter through incised

left kidney, met with same obstruction as before. Further operation was postponed two weeks; then incision disclosed phosphatic calculus ¾ inch long; delivered; successful recovery." While giving consideration to the expectant plan, this author apparently recognizes no place for cystoscopic methods of removal, as he does not mention them in connection with the reports of any of his four cases of ureteral stone, although all of these were in females and located toward the lower end of the ureter.

One of the most striking cases, showing the unlooked-for complications that may occur in connection with the open operation for ureteral calculus, even after the procedure seems to have been brought to successful and satisfactory issue, is graphically related by Dr. A. V. Moschowitz (Annals of Surgery, December, 1908), a brief abstract of which is herewith given: —

"Operation, July 20, 1908; bilateral ureterolithotomy, removing two calculi from the pelvic portion of each ureter, through extra-peritoneal incisions. Small red-rubber drainage tube used for drainage on each side, a small strip of iodoform gauze being pulled through each tube. One week after operation the left tube was removed, coming away easily; but was followed immediately by a tremendous hemorrhage, which stopped for an instant, and then recurred in sufficient quantity to fill a two-quart pus basin half full. I promptly introduced a finger, which controlled the hemorrhage at once.

"The patient was then anesthetized, and the wound reopened. A hole sufficiently large to admit the tip of the little finger was found in the external iliac artery, at a point where it was pressed upon by the drainage tube. The vessel was ligated above and below the hole with No. 3 catgut. I was beginning

to congratulate myself on the fortunate outcome of a disagreeable accident, when I lifted up the sheet with which the patient was covered; the sheet happened to catch in the safety pin, which pierced the tube on the right side, and pulled out the tube for not more than half an inch. There promptly ensued an identical hemorrhage. The same conditions were found on this side, and exactly similar steps were resorted to to control the hemorrhage. It is, I am sure, needless to say that all pulsation ceased below the seat of the ligature, and both lower extremities became blanched. After the usual abdominal dressings had been applied, both lower extremities were wrapped in cotton and bandage, and patient placed in bed, with legs and trunk slightly elevated. Despite the formidable hemorrhages, and in spite of the enormity of the operation the general condition of the patient was very fair. On the evening of the same day the toes were warm, of a delicate pink hue, and capable of slight active motion. On the following day, slight femoral pulsation was to be felt, and on the third day an occasional flutter was noted in the dorsalis pedis artery. Thereafter his convalescence was uneventful; recovery."

The author attributes the hemorrhages to the pressure of the drainage tubes against the external iliac arteries, with resulting perforation of the vessels. He does not tell us how much sleep he lost in anticipating the possibility of gangrene of the lower extremities, during the next-following period, but he says, "The case gave me some very anxious moments and the patient can well be congratulated upon the fortunate outcome."

Peterkin (Internatl. Journal of Surgery, Feb., 1909) reports three very instructive cases along this line, showing a chapter of accidents and complications to which it is possible for such operative procedures

to lead; including post-operative shock after lumbo-ilio-inguinal incision and the removal of ureter stones; sloughing of stitches, reopening of the wound, prolonged convalescence, renal colic, severe hemorrhage from the wound thirty-six days after operation; renewed shock and repeated hemorrhage covering several days; sudden filling of the bladder with clots; anuria; perineal section and drainage; incision reopened; discovery of rupture of obturator or internal iliac artery; uremia; labored respiration, pulse 125 to 140; and, finally, in the laconic words of the author, "Vitality was such that I obtained permission from the wife to perform postmortem and obtain specimens"; but to the great surprise of all attending, the patient escaped this fate, recovered, and later passed more calculi, apparently from the left kidney. While the patient recovered, there is no denying that he had a close call, in addition to much suffering; and the case cannot be adduced in support of the belief that the operation of ureterolithotomy is "no worse than a bad cold."

In contrast, it would seem appropriate to quote from a contribution to "Surgery, Gynecology and Obstetrics," by a surgeon who describes his "Simple Method of Removing Stones from the Lower Ureter" in such alluring language as to lead a confinding and innocent bystander into doing it on the slightest provocation. The author naively remarks that "Some of the proposals which have contemplated the removal of these concrements would make it seem a difficult, if not sometimes a dangerous procedure. I am able to state, as a result of my experience (four cases, at the time of making the report), that stones of moderate size lying anywhere in the pelvic portion of the ureter are very easily found and extracted." And the assurance is given that "The first time the operator follows the method detailed he will be astonished

at the ease with which the stone finds its way out of its resting place into the grasp of the thumb and finger" — furnishing, doubtless, another illustration of "uncontrollable impulse" — this time on the part of the stone, to give itself up into the hands of law and order and be good ever thereafter.

Nevertheless, we cannot forget the numerous cases of complication and distress that have occurred in the hands of competent and experienced surgeons. Moreover, the open operation, simple as it is pictured, has a mortality that cannot be ignored. Of twenty-one such operations collected by Fowler, there were three deaths; of twenty-three by Deaver there were two deaths; together furnishing a mortality of ten and eight tenths per cent. Tenney has collected one hundred and thirty-four cases of ureteral calculus (analyzed in Boston Med. and Surg. Journal Feb. 4, 1904), of which one hundred and twenty-two were subjected to cutting operations, giving the following results: One unrecorded; ninety-eight recovered, twenty-three died. Since some of these deaths were due to anuria or partial anuria, existing at the time of operation, it would be unjust to utilize them all as indicating the seriousness of the cutting operation; but, at the same time, it may be justly said that a less serious procedure, such as cystoscopic manipulation, would not have entailed the same amount of shock and risk that the open operation did, in these cases of death. At any rate the facts are as follows, as stated by the author: Eight cases were operated on while suffering from total anuria and three from partial anuria, making a mortality of eleven deaths in twenty-one cases, or fifty-two per cent operated upon for anuria.

Seven out of the fifteen cases which were distinctly stated to be suffering from fever and pus in the urine at the time of operation, died, making an apparent

mortality of forty-seven per cent in cases operated on for pyelitis or pyelonephritis. Probably there were more than fifteen cases, but I have included only the cases in which these facts were distinctly stated. In the nineteenth case the bladder was opened above the pubes and the ureteral orifice was slit, opening into the general peritoneal cavity. The patient became maniacal, passed no urine on the twelfth day, died on the thirteenth; never had any fever, but extremely rapid pulse. The twenty-first case was under chloroform nearly two hours, and showed fatty degeneration of heart muscle at autopsy. The twenty-second case had two hours of chloroform and ether anesthesia, and also showed fatty degeneration of the heart muscles at autopsy.

In summing up, the author says: "If we subtract the twenty-one cases of anuria, and the fifteen cases of pyelonephrosis or pyelitis, we have left eighty-five cases operated upon for stone in the ureter, apparently without grave complications, and in which the results are stated. In these eighty-five cases there were five deaths, giving a mortality of a little less than six per cent." Such an interpretation, however, would seem unduly liberal in exempting from blame the cutting operation. Pyelitis and pyelonephritis are frequent factors in ureteral stone cases, and it seems hardly proper to cast out of the reckoning seven of the deaths after operation on that account. (If the conditions were severe and unfavorable at the time of operating, so much the more reason for first applying the less heroic measures.) Therefore, if we add the fifteen cases so affected, together with their seven deaths, to this series, it gives twelve deaths in one hundred cases, or twelve per cent mortality, including a liberal deduction for anuria and similar conditions.

While the medical profession may well be gratified at the present-day ability to open the abdomen with

a large degree of success and relatively small mortality, that should not detract from its gratification at being able to hew still closer to the line of safety, in certain cases, and remove ureteral calculi by less heroic measures — by the expectant or the cystoscopic plan. If either proves successful the desired object is attained and "all is forgiven"; if unsuccessful, no harm is done and the patient is still receptive for the operative method, and in no worse condition for it. It is probable that the estimate of Leonard is correct — that fifty per cent of ureteral calculi are capable of being relieved by the water-wagon measures of the expectant plan; but what of the other fifty per cent? Certainly it should not be immediate resort to the operative plan. The logic of the situation is against such a course, and the records of medical history tell us of a sufficient number of successes attained by cystoscopic measures to warrant their use under conditions readily recognized as favorable for their success. Without going into the details of individual cases (which are attainable in the literature), we know that such successes have been reported by Howard Kelly[1], Moschowitz,[2] Young,[3] Kreissl,[4] Casper, Kolischer, Schmidt, Bransford Lewis,[5] and a number of others. I have never heard any disputation or denial of these records. They embrace successes by cystoscopic methods ranging from the ureteral injection of oil or glycerine to the use of forceps, dilators, scissors, sounds and other cystoscopic accessories; and have referred to calculi impacted in the ureter at various points. Naturally, the lower the impaction in the canal,

[1] Jl. Am. Med. Assn., March 3, 1900.
[2] Med. Record, May 1, 1909.
[3] Amer. Medicine, Aug. 6, 1902.
[4] Chgo. Med. Record, Mch. 1899.
[5] Southern Med. Jl., June, 1910; Cincinnati Lancet-Clin., Mch. 4, 1905.

the more accessible to cystoscopic manipulation and the greater probability for the success of the method. While the low situation makes it relatively easier for cystoscopy, it is generally agreed that it is the low-lying stone that is most difficult of access and removal by the open operation. There are three points of relative narrowing or physiological constriction in the ureter, at which calculi in their descent are prone to lodge; but, according to statistics on the subject, the lowermost of these, namely, the intra-mural portion, is the one at which the great majority are arrested. Hazen (Long Island Med. Jl., June, 1908), quoting from the contributions of Schenck and of Tenney, based on surgical and post-mortem reports, says that "The vesical end of the ureter is the most frequent seat of arrested calculi. They are found here more frequently than in all other situations put together; and over two and a half times as frequently as at any other single location. In studying the one hundred and thirty-four cases referred to, Tenney (*ibid.*) says that thirty-five were caught at the first asthmus, eighteen at the second, and seventy-three at the third (lowermost)."

One illustrative case of cystoscopic removal of ureteral stone may here be cited, pertaining, as it did, to a member of our own profession and the better able, therefore, to appreciate the conditions prevailing and the ease and promptitude of final relief: Dr. W. L. Goddard of Salisbury, Tenn., sixty years of age, consulted me in October, 1908; referred by Dr. E. M. Holder, of Memphis. The patient said that he had first noted urinary disturbance about twelve years previously, when he had had severe colic in the left renal region, lasting several hours and requiring the use of morphine hypodermically for relief. Since then he had had a number of similar attacks. One small stone had been passed and caught by him, a year before.

During the past nine months the patient had felt severe pain in the region of the left ureter, low down, never having been free from it at any time during that period, except when asleep. Examination: Both urines clear and free from pus or blood. Cystoscopy easy. Right ureteral orifice normal. Left orifice showed a small, black plug embraced in its lumen, and emerging slightly — plainly visible through the observation (Universal) cystoscope. It was shown to and clearly seen by several physicians, including Drs. Hopkins, Burford and Lund, who were in the office at the time. After that the universal cystoscope was replaced with the operative cystoscope, through which an alligator forceps was passed and inserted into the ureteral opening. It was stretched widely within the orifice, and immediately the little plug popped out into the bladder, followed by a spurt of yellow, purulent urine, plainly visible to the eye. The plug was later removed from the bladder, and proved to be a spiculated uric acid calculus about the size of a grain of wheat. The retention of the stone in the ureter seems to be explainable on the ground of the little pointed spicule that projects from one side of it and was probably buried in the wall of the ureter. It is interesting to relate that immediately the stone jumped out of the ureter the patient remarked, "That is the first time in nine months that I have been free from that pain." The pain did not recur afterwards.

For the sake of confirmation, that patient was retained in the city for two days; after which time the left ureter was catheterized, the catheter passing easily to the kidney pelvis and draining clear, healthy urine therefrom. He then went home. He suffered no ill effects from the cystoscopic manipulation, either at the time or afterwards, and the relief it afforded was complete.

Of course it cannot be claimed that cystoscopic endeavor will always meet with such a happy outcome, nor so promptly attained. The injections or ureteral dilatings may have to be repeated several times, with the stone descending in successive steps, so to speak, until its final expulsion or extraction from the ureteral orifice. But even that, it may well be argued, is better than abdominal section for securing the same end. Rigdon (California State Jl. of Med., November, 1909) puts the case succinctly and fairly when he says: "Before any cutting operation is advised repeated efforts should be made to dislodge the stone by means of the ureteral catheter, the injection of vaseline, etc. . . . If the calculus can be brought to the bladder wall it may be possible to remove it by dilating the ureteral orifice and applying forceps through the operating cystoscope."

That proposition would seem to be logical and fair enough; and yet, is it practiced to any great extent at the present time? I venture to guess that not one ureteral stone in fifty is accorded such considerate treatment. With few exceptions they are given the short route from expectant to operative plan.

In thinking over the matter it occurred to me that a somewhat analogous situation was furnished in respect to nasal, laryngeal, bronchial or tracheal surgery, in which foreign bodies were lodged in these parts. I requested a brief statement on the subject from my friend, Dr. Wm. E. Sauer, who has had much experience in such work, and who has kindly given me the following: "Laryngo-tracheo-bronchoscopy has been developed in the past fourteen years, with Killian as the path-finder. This procedure is not only familiar to all laryngologists, but many surgeons and physicians are satisfactorily employing it. Its chief use has been in the diagnosis and treatment of foreign bodies in the trachea and bronchi.

Up to the present time five hundred and ninety-five cases have been reported in which the bronchoscope has been employed in the treatment of foreign bodies in the bronchi, with a mortality of thirteen per cent. In the more recent cases the mortality has been reduced to nine and six tenths per cent. This is a decided improvement over the pre-bronchoscopic period. The mortality of aspirated foreign bodies before the introduction of the bronchoscope was very high. According to the statistics covering seven hundred and seventy cases compiled by Preobraschanski it was fifty-two per cent. If those cases in which the patients died of lung complications caused by foreign bodies were added, in which no diagnosis was made, the percentage would be still higher.

"Karewski in 1893 reported fourteen thoracotomies for foreign bodies, with only two successful cases; and Tuffiner in 1897 reported eleven pneumonotomies for foreign bodies, in ten per cent of which the foreign body was not found. In four of these cases the operations were fatal.

"These reports show a remarkable advance in the treatment of foreign bodies in the bronchi since the advent of the bronchoscope. Equally good results have been achieved with the esophogoscope."

The argument that the cystoscopic operative measures are chimerical, too refined and too difficult for practical utility, is not more convincing than when the same argument is applied to the use of the bronchoscope, the esophagoscope, the ophthalmoscope, the X-ray apparatus, etc. If any of these several instruments or appliances are needed in a given case and their applications offer promise of securing relief, the patient should be given the benefit of their use — irrespective of the ability of one physician or another to use them.

If the march of science depended on all keeping step, science would be a sorry laggard, indeed.

The Apparatus and the Mode of Use.

It is as practicable to make use of the purposive manipulations of operative cystoscopy as it is to work in other cavities of the body, inaccessible except with the proper apparatus. It is as practicable to dilate a stricture of the ureter as of the urethra — though, of course, not as easy.

The instrument and accessories, with which I have had most experience, are practically the same, with a few improvements, as the model shown and reported on in 1904, before the Mississippi Valley Medical Association (*ibid.*). It is used with either water or air as a distending medium for the bladder, and with or without the lens telescope according to circumstances or the predilection of the operator. Through the sheath, all of the several accessory instruments may be introduced and manipulated while under the eye of the operator, looking through the telescope or the ocular window. The orifice of the ureter may be entered and stretched with the dilator, or incised with the scissors. The alligator forceps may be made to grasp a small stone engaged in the orifice, dislodging it either by stretching the orifice or by traction on the stone. If the latter is situated higher up in the channel, say within an inch or an inch and a half of the orifice, it is possible to reach it by means of the flexible ureter forceps, modeled after the bullet forceps of old. This is introduced into the ureter closed; is advanced thus along the channel, the curves of which it can trace for the distance mentioned (I have used it as high as two inches in the ureter); when it meets with obstruction it is opened, gently advanced and closed again, and gradually

withdrawn — with the hope of bringing with it the recalcitrant object. If not thus accomplished, all is not yet lost.

If a ureteral stricture be interfering with the descent or expulsion of the stone, it may be dilated either with the metal dilator already mentioned, or by means of bougies of increasing sizes, introduced successively into the ureter past the offending part. Afterwards, oil or glycerin may be injected through a ureteral catheter, paving the way to easier passage downward for the stone. Cunningham has added an ingenious instrument, in the shape of a flexible sound of metal, with a tip that can be extended after it is brought into contact with the stone, in the hope of making the traction necessary for removal or descent of the stone.

It is not advisable to push the measures to an extreme in the endeavor to finish at one séance. It is preferable to be satisfied with slower progress, entailing less pain or anxiety on the part of the patient. In the interim until the next essay at removal, he may be instructed to drink plentifully of water and other fluids, and to use a vessel and filter with each urination, in order to catch any stone that may possibly escape.

All of the manipulations are carried out under efficient local anesthesia and should not be more objectionable than an ordinary cystoscopy or ureteral catheterization. At any rate, if successful they are decidedly less objectionable than abdominal section for attaining the same purpose.

FURTHER OBSERVATIONS ON URETERAL OBSTRUCTION IN EARLY INTERMITTENT HYDRONEPHROSIS.

O. S. FOWLER,
DENVER, COLO.

I wish to present in this paper, for your consideration and discussion, a procedure in renal radiography which I believe to be entirely new and which was first presented by the author to the Colorado State Medical Society in August, 1911. By it I hope to convince you that an absolute and positive diagnosis of ureteral obstruction or kinking may be made in the very beginning of intermittent hydronephrosis, which if undiagnosed and untreated will finally result in great impairment or even destruction of the kidney.

With the perfecting of the cystoscope and its proper use, and with the development of renal radiography to almost an exact procedure, we are now able to make a more accurate diagnosis upon the parts of the genito-urinary tract than upon the soft tissues in any other portion of the body, without exception; yet we see a marked apathy on the part of many general surgeons and diagnosticians to take proper advantage of the valuable and usually indisputable findings of the cystoscopic and radiographic evidence in arriving at a diagnosis in obscure abdominal conditions in which the kidney may be vitally concerned, preferring, often, to use so-called exploratory incisions, or attempting to find cause for the symptoms in some other organ and perhaps removing an unoffensive appendix, or in doing some more than

useless operations in the female pelvis, or a gastro-enterostomy, when there is no further evidence of ulcer than the normal whitish appearance of the pylorus to warrant it.

In consulting the literature on the subject of intermittent hydronephrosis it is plainly evident that practically all authors writing on the subject describe the lesion in its advanced stages, laying great stress upon the so-called characteristic symptoms: of a large tumor in the kidney region; the passing of a large quantity of watery alkaline urine of low specific gravity, and containing pus cells, with the concomitant disappearance of the tumor; saying nothing of the early stages while the kidney pelvis and ureter are being gradually and most painfully dilated from normal, eight or ten cubic centimeters, to the size of a tumor that is easily palpable. This, certainly, cannot be regarded as modern surgery, for it deals mainly with the diagnosis and removal of a completely destroyed organ, or the saving of one very much crippled; this, without considering the years of suffering which these patients have to endure; many of them coming to us finally as such nervous wrecks, that if we can now remove the original cause of their trouble, we still have an extremely difficult case from a neurological standpoint, and it may even be incurable. It appears to me that definite modern constructive surgery should be only satisfied with methods of diagnosis that will certainly recognize these surgical conditions at such an early period that the organ may be retained for the patient in its normal condition, and eliminate the non-surgical exploratory operation on the urinary tract.

During the past several years much has been written concerning the detection of intermittent hydronephrosis by endeavoring to determine the capacity of the kidney pelvis and an attempt has

been made to establish a definite amount above which the kidney would be considered hydronephrotic, and much has been written in defense of this method. However, I am sure that we all have experienced considerable difficulty in its application, and from the fact that no definite amount has been agreed upon as to what really constituted the normal, for we have seen the amount recommended varied from 120 c.c. to 80 c.c. to 50 c.c. before their pain was reduced, and some are now claiming still a smaller quantity. I have used these methods with some success but must say that the precedure as a whole is unsatisfactory and often entirely unreliable, and I have rejected several cases because they would not hold as much as was recommended, and I now know that they certainly did have an intermittent hydronephrosis. Permit me here to say that I do not doubt but the kidney pelvis that will hold the above quantities of fluid is surely hydronephrotic, but I am also sure that these represent only a small percentage of the cases that have more or less obstruction to the free outflow of the urine, that apply to the profession for diagnosis and relief, and usually only after many years of suffering is their case given its proper attention, for they are too often regarded as neurotic and hysterical individuals, unworthy of our best and earnest efforts toward relief.

I later depended more upon the reproduction of the pain, regardless of the amount required, and found that in a series of thirty-three cases giving distinct symptoms an average or only fourteen c. c. was required to reproduce the symptoms, of more or less severity. However, this method is open to many objections, and with much reason, for you cannot depend upon the patient's statement of the character, location, etc., of the pain produced. I attempted about a year ago to devise some method

which would certainly be beyond dispute as to its accuracy, and I wish now to present this procedure which seems to be, practically, above criticism. It was my desire to demonstrate the probable ureteral obstruction with the patient just having gone through some of the bodily movements that hitherto had produced an attack. Therefore, with the able assistance of Dr. George Stover, Rœntgenologist, I have been able to demonstrate this lesion in a number of cases, also to exclude the kidney in other individuals and to differentiate ureteral obstruction in obscure abdominal difficulties.

The first work of renal radiography was done by Voelker and Lichtenberg in 1905, by the injection of an albuminoid silver salt into the kidney pelvis. Much work has been done since and the method has proven to be scientifically accurate and of inestimable value. Following is my method of investigation: When I first see the patients with symptoms of possible ureteral obstruction, I cystoscope them, making a thorough examination of the entire urethra and bladder, then catheterize one or both ureters, collecting the urine for study, and then inject the pelvis of one or both kidneys with a sufficient amount of a colored fluid to reproduce their old pain or to produce a new one. If they say it is the same pain and in the same position I do not use or regard this as sufficient evidence, as some do, to base a diagnosis and operation upon, but use it simply as an indication of further investigation. Then at another sitting I proceed to demonstrate obstruction by a series of radiographic pictures, my method being as follows: —

First, with the patient in the recumbent position, the radiographic ureteral catheter is inserted to the kidney, which has been massaged up into its position. If there has been any symptom of stone in the tract, I now take a stereoscopic radiograph.

Then I inject collargol, in strength of ten to twenty-five per cent solution, gently into the kidney pelvis and ureter. The second picture is now taken. I then stand the patients upright on their feet, getting them in position before a properly adjusted plate, keeping the catheters in position to the kidney, having withdrawn the cystoscope before standing them up. Now I have them take a full breath and hold it, with both arms high above the head, have them bend forward, backward and sideways, and reaching high upward with each hand, rising at the same time on the opposite foot. Then I have them raise high on their toes, and drop suddenly upon their heels, thus endeavoring to force and jar the kidney into its pathological position, at the same time withdrawing the catheter and gently injecting more of the solution. I have at times produced some discomfort here, and once considerable pain. By this method I have secured some most satisfactory plates, some of which I will show you today. I wish to say here that it is only in the latter part of the procedure that I claim any originality of maneuvering.

There is one feature of these cases about which I am often asked, and that is, whether, where the kidney is movable and is not giving the patient any trouble, if a radiograph were taken with the patient in the standing position, would the ureter not show or apparently show a kink in its upper part? I can now say that it does not, but does show simply a gentle bending in its course, with no distinct sharp kinking. I explain this by the fact that the ureter is freely movable in its upper course in any direction and freely movable longitudinally in its entire course, and is also markedly contractile longitudinally, so that when the kidney drops downward the ureter becomes relaxed above and contracts considerably in its entire course and takes up

much of this slack of its upper portion. I have observed this in a number of cases where the ureter seemed much too short to force the prolapsed kidney up into its proper place, but upon operation there was no evidence of the ureter being really under proper length. As described later, to show a kinking it is necessary for the ureter to be fixed or suspended in some part of its upper course.

There is one other feature, often dwelt upon and sometimes considered as sufficient reason for operation, and that is the so-called pulling upon the vessels and nerves by a loose kidney. I regard this as entirely a theoretical explanation of a probable intermittent hydronephrosis, which has not yet reached the stage where the organ presents the old-time symptoms as mentioned above, and which should not be given any weight; for unless the lesions can be demonstrated they should not be operated.

Morphology. The morphological changes in intermittent hydronephrosis are a gradual course of dilitation of the kidney pelvis and that portion of the ureter above the point of obstruction, from normal to complete destruction of secreting tissue, with an accompanying destruction of function in advanced hydronephrosis. The obstruction varies from a mild retardation to complete temporary blocking.

Symptoms of Early Intermittent Hydronephrosis.

First, the history usually given is that the attack is brought on by hard work, unusual muscular effort, as sneezing, coughing, or reaching high, or by being jolted on rough roads, etc. The pain may come on suddenly or the severe attack may be preceded by a dull ache in the kidney region for even a day, usually only hours. This pain may be dull or cutting in character, usually extends to the costo-vertebral angle

and referred down the course of the ureter and inside of leg, as in kidney stone,—but not always, by any means. A Dietel's crisis is usual, the attack rarely being so severe as to produce shock. This may last severely for several hours, and the kidney is usually tender for a few days following relief, which is often obtained by lying down, elevating the hips and feet, or with hot applications. One patient found that she could obtain relief by assuming the knee-chest posture.

It has been mentioned, and I believe correctly, that the pain in intermittent hydronephrosis is always more severe in the early than in the late stages, explainable by probable distension paralysis similar to the over-distended bladder in prostatic obstruction. The pain may even be referred to the opposite kidney region or along the course of the other ureter. This occurred in one case of my series, and the pain reproduced was referred to the opposite side. There has been described a painless intermittent hydronephrosis. This I believe is an impossibility. It is found only in the congenital type of hydronephrosis and the patient has suffered pain, probably, in infancy and early childhood, for we remember little that happened to us before about five years of age, and it was not recognized until the dilatation was so great as to call attention to a tumor. I believe this is the first time that the above explanation has been advanced for the so-called "painless intermittent hydronephrosis."

Tumor. Tumor is not present except the normal sized kidney, which is always tender.

Urinary Symptoms. There may be a reflex anuria during the attack, which affects the sound kidney as well; after the cessation of the severe pains they may be again secreting normally, or there may be found a marked reflex polyuria. There is no burning upon urination, nor tenesmus of the bladder.

Urinary Findings. In this early stage the urine is normal, unless there has been a pyonephrosis established on top of the hydronephrosis.

Cystoscopic Findings. The urethra, bladder, and the mouths of ureters are all normal, except that you may see a pouting ureter occasionally; the ureters are also contracting and expelling the urine normally unless the patient is in an attack. From the picture as shown here you might think there was no trouble in the urinary tract. There is no reason, however, why any other condition might not accompany this one.

Temperature. There is no rise in temperature in any stage of this condition unless a pyonephrosis has been implanted on top of the hydronephrosis.

Palpation. There is muscular rigidity during the attack, and tenderness is present in all stages in the costo-vertebral angle and over the kidney anteriorly, and possibly along the upper course of the ureter.

Functional Tests. I have been unable to show any impairment of function in these early stages. Thus you can readily see that these symptoms markedly differ from those usually found in the texts, such as a large tumor, which may disappear with the passing of a large quantity of alkaline urine or the constant dropping of a large amount of urine through the ureteral catheter when such a kidney is catheterized.

Differential Diagnosis. It will be necessary for this condition to be differentiated from acute and chronic appendicitis, from gall-bladder disease, from possible ovarian tumors and other difficulties, from pleurisy, from gastric ulcer and other stomach disturbances, from stone in the kidney; for all of these conditions have been wrongly diagnosed in the presence of demonstrable ureteral obstruction in early intermittent hydronephrosis. This can be done defi-

nitely, in all cases, only by the proper use of renal radiography, as described in this paper. Many of these cases have been diagnosed as kidney stone and are referred to the radiologist for detection of the same, but no stone shows in seventy per cent of cases presented with clinical diagnosis of kidney or ureteral stone, according to Sydney Lange of Cincinnati. Many of these cases then have had their appendix removed by the over-zealous surgeon (operator) and without relief, and are assigned to the neurotic and hysterical classes.

Dr. Braasch reports that thirty-five per cent of such cases coming into his service have had their appendix removed without relief. In my series of cases diagnosed as intermittent hydronephrosis, forty-five per cent of those definitely proven to have a right-sided lesion have had their appendix removed without relief. Twenty-two per cent of the women patients have been treated from a few months to several years for so-called "ovarian trouble." Two have been treated for pleurisy. The others have been variously diagnosed as stomach trouble, neuroses, hysteria, rheumatism, kidney stone, and bladder trouble. It appears to me that these figures represent a rather high rate of error for present-day surgery.

Etiology. The etiology of intermittent hydronephrosis, I consider to be based upon two factors only: first, the mobility of the kidney; this alone is not sufficient or of particular importance, but it depends entirely upon this mobility, which may be little or much, associated with a relatively short aberrant vessel, artery or vein to or from the lower half of the kidney, which may run either in front of or behind the ureter or its pelvis, over or under which the ureter may have a somewhat stationary point of partial or complete fixation, which fixed suspension point must be within the radius of the kidney's excursion, so that the

portion of the ureter below this fixation cannot follow the kidney and become loosely folded without any marked or sharp kinks in its course. Its normal contractility undoubtedly takes up much of this slack upper portion of ureter if not prevented by some fixed point. It is also true that periureteral adhesions between the ureter and any adjacent structure, such as the ovarian or spermatic artery or vein, or the genito-crural nerve may act the same as an aberrant vessel. The kidney in its downward abnormal movement may rotate upon any one of its three axes, vertical, horizontal, transverse, or anterior-posterior; any of these rotations certainly add to the probability and completeness of the obstruction from kinking. Thus the kidney might be movable only to the first degree, or even not demonstrably movable; if associated with a short, tense, aberrant vessel it may and will give sufficient blocking to the urine to occasion the symptoms in any case, but on the other hand the kidney may be of the so-called "wandering" type, in the presence of a long, loose, aberrant vessel, or with a normal, freely movable upper ureter, and not occasion the least inconvenience. Therefore, for these reasons, it is not logical to base judgment of the necessity for a surgical procedure upon the greatly abused movability of a kidney; but it should be based entirely upon the only logical and sensible basis of a demonstrated obstruction in the ureter to the free outflow of the urine, and any man who operates for a less cause will, sooner or later, have much reason for regret and in many cases even deserves severe criticism.

Much of the literature of the kidney is given up to various and almost vague discussions upon the extent of the mobility that kidneys may attain, with no small amount of quibbling over an unimportant classsification of this mobility, and very much more in tell-

ing you how to proceed to determine even the slightest degree of excursion; as though this were really of some importance to you in fixing the blame upon this organ for any series of symptoms. I wish here to emphasize that the only value there is in determining the presence of undue mobility is its value as an indication to investigate it further and discover whether it is relevant or not in the present trouble. I believe I am borne out in the above statement by the history of operative procedures in the past ten or fifteen years, in which time we have seen the sentiment change from operating upon all mobile kidneys to the other extreme, where a man who operates upon any mobile kidney is regarded by some as an operation seeker, but I am sure that the pendulum will gradually assume its proper position in regard to these cases and that we will use a sensible, reasonable basis for advising operative procedures, that of demonstrating an obstruction to the free outflow of the urine, and operate only these.

As to the etiology of movable kidney, volumes have been written and no factor can be agreed upon as even the most important. Pregnancy has been assigned as a very important factor, but Harris has shown that in one hundred and five cases examined fifty-two had not borne children, while fifty-three had borne one or more. Loss of weight (perirenal fat) has been assigned a prominent rôle, but has little to support it, for I have seen just as much mobility, radiographically, in fat and plump subjects as in the thin ones, and am very sure that loss of fat is certainly not a factor in producing mobility, in fact am inclined to regard excessive fat as a cause for undue mobility. Dr. Longyear's argument that with a ptosed kidney there is always a ptosed colon, and in fact that this heavily loaded colon is a productive factor in pathological kidney mobility, seems to me

to be reasonable and sane, and I would certainly regard it as a considerable factor; also, the idea advanced by Becker and Lenhoff that body configuration was important. They submitted measurements to demonstrate that it is a physical impossibility for the kidney to remain in the upper abdominal zone when its capacity was too small for all the organs intended for that region, and that the female pelvis is broader than that of a male. These are, I believe, the most probable reasons yet offered. It is also claimed with much cause that nature has left the kidney improperly supported, that perhaps man assumed the upright position more rapidly than its supporting structures justified. But, regardless of the etiology of pathological mobility we must concern ourselves more at present with the recognition of those giving difficulty and offer the appropriate treatment, for perhaps if we did certainly know its exact etiology it is quite probable that we would have little opportunity to instruct against its occurrence.

Treatment. It would seem that after the lesion of ureteral blocking is definitely demonstrated there is little argument over what should be advised. It is necessary to relieve the obstruction. To accomplish this a nephropexy should be done and the offending aberrant vessel or adhesion found and divided. I must lay much stress upon this latter statement, for it has been definitely shown that a considerable percentage of anchored kidneys recur, and unless this offending vessel or adhesion is removed then most surely the intermittent hydronephrosis would recur when the kidney became loosened from its moorings. Therefore, I must lay much stress upon the definite diagnosis of the point of obstruction by the collargol method, with the patient in the standing position, and this I believe to be a sufficient justification of the slight discomfort and the expense

of the procedure. It may also definitely fix the blame upon the kidney where the patient's statement upon injection is doubtful or negative. And by it you will prevent yourself from operating upon the wrong kidney in case of transposed pain. I therefore believe the method to be eminently consistent with conservative surgery. The results of eleven cases operated in this manner or followed by me have to date shown entire relief from their symptoms, covering a period of three to eighteen months. I believe the use of belts, supporters, corsets, or adhesive straps to be wholly inadequate and inefficient, offering no reasonable chance of permanent relief, and are a useless and worthless feature in most cases. In operating these cases, we must be careful not to attach the kidney too far from the median line or too high up, for if the kidney was originally forced down from too little space there is still too little space for it and it would necessarily be forced down again. As to the method of nephropexy, there is little to choose between the different methods; simply select the one which you can do best.

I wish to acknowledge obligations for the efficient personal services of Dr. George Stover, Rœntgenologist, for his valuable assistance and suggestions in this work.

Case Reports.

Mrs. J. H. Referred by Dr. Russel, Lamar, Colo. History: Several attacks of quite severe pain in region of left kidney for five months following confinement. In good flesh. Kidney not palpable. There is a constant ache in the same region. Left kidney. Patient recumbent. Cystoscope withdrawn. Fifteen per cent collargol injected in the kidney. Renal capacity 19 c.c. Nothing abnormal shown in kidney pelvis or ureter. Position normal.

Fig. I. Mrs. J. H., same patient, standing upright. Catheter withdrawn from upper ureter. Kidney dislodged. Drops one and one-half inches. Very little over the normal excursion, but a definite kink in ureter is shown one and one-third inches below pelvis. Diagnosis: Intermittent hydronephrosis without pathological dilatation of kidney pelvis and without impairment of function.

Fig. II. Miss V. G., housemaid, aged forty. Has lost weight. Now rather thin. Left kidney palpable. History: Severe pain in left kidney region, following hard work, such as washing, scrubbing, etc. Relief is obtained by lying down and elevating hips. Frequency of urination while attack is on. Reflex polyuria follows attack. Urine normal. Patient standing. Ten per cent collargol injected. Catheter withdrawn from upper ureter. Kidney dislodged. Its pelvis between third and fourth lumbar vertebræ rotated on its anterior posterior axis so that its outer border is facing downward, and level with the crest of the ilium. Renal capacity 18 c.c., kink in ureter three-quarters inch from pelvis. Diagnosis: Intermittent hydronephrosis without patholgical dilatation or impairment of function. Relief to date, eight months after operation.

Fig. III. Mrs. J. F. M., housewife. Referred by Dr. R. Hudston, Denver, Colo. Aged thirty-two. In good flesh and plump. Has had four attacks in past year and a half, lasting one to three hours. Vomited; had cold sweats lasting an hour or more. Tender for several days. Urine normal. Patient standing. Catheter withdrawn from upper ureter. Renal capacity 20 c.c. Kidney dislodged downward and drawn toward the vertebra. Kink in ureter one inch below kidney pelvis, which is dilated just enough to show slight rounding. Diagnosis: Intermittent hydronephroses from ureteral obstruc-

tion, without pathological dilatation or impairment of functions. Operation showed a short, tense, aberrant artery to the lower pole of the kidney. Complete relief to date, nine months after operation.

Mrs. S. J. W., housewife. History: Two previous abdominal operations, appendix, and ovarian cyst. Left kidney. Has had severe pain in left iliac region for six years in recurring attacks with increasing severity. Has had so much morphine that she has now acquired the habit. This pain has been called "ovarian trouble," "hysteria," etc., and has been refused professional aid during the so-called hysterical attacks. Kidney is not palpable. Weight two hundred and twenty pounds. Urine normal.

Fig. IV. Patient recumbent. Twenty-five per cent collargol injected. Kidney in normal position. Pelvis and calices normal.

Fig. V. Same patient, standing, twenty-five per cent collargol injected. Renal capacity 14 c.c. Kidney dropped two and one-half inches. Kink in ureter about two and one-half inches below pelvis. Ureter apparently dilated, because patient stood too far from plate. Diagnosis: Intermittent hydronephrosis, without pathological dilatation or impairment of function. Operation: Kidney very much hypertrophied, but normal. Aberrant vein from lower pole, in position as shown by kink. Complete relief to date, eight months after.

Miss H., aged twenty-two. Referred by Dr. Farrington. Normal weight. In good flesh. Two years ago had pain begin at crest of right ilium, extending downward into right pelvis. No connection with menstration. Diagnosed as right tubal abcess and treated for same. Several attacks since. Comes on after hard work. Relieved by lying down on hot-water bag. Polyuria after attack. Double abcesses in ischio-rectal fossæ, still present as connecting

Fig. I.

Fig. II.

Fig. III.

Fig. IV.

Fig. V.

Fig. VI.

Fig. VII.

Fig. VIII.

Fig. IX.

Fig. X.

Fig. XI.

Fig. XII.

Fig. XIII.

Fig. XIV.

Fig. XV.

Fig. XVI.

sinuses. Right kidney palpable and extremely movable. Urinary findings negative. Cystoscopic examination: Right ureter pouting, left normal. Bladder mucosa normal. On dilatation of right kidney pelvis patient said that the pain produced was not the same, but later thought that it was, thus making the procedure of no diagnostic value. Radiographs taken. Renal capacity, 16 c.c.

Fig. VI. Patient recumbent. Right kidney one and one-half inch below normal position. No inflammatory indications. Pelvis and ureter normal. Ureteral catheter, not into the kidney. Ureter is curled a half turn at end of catheter, which met obstruction 25 cm. from mouth of ureter.

Fig. VII. Same patient, standing upright. Kidney entirely within pelvis. Rotated on anterior-posterior axis so that outer border is facing downward. The kink in the ureter opposite fourth lumbar vertebra. Diagnosis: Right-sided intermittent hydronephrosis, without pathological changes.

Mrs. C. J., aged twenty-five, housewife. Patient thin, but not emaciated. First attack of pain one year ago, when six months pregnant, in region of left kidney and down the ureter. Sixteen hours later same sort of pain in right kidney with the pain down the right ureter, and into the external genitals and inside right leg. Never another attack in region of left kidney. Was very tender in both kidney regions for several days. Had frequency of urination, with tenesmus. Pus in urine. Vomited during attack. Passed one stone following these attacks, size of a small bean. Two other attacks on right side before confinement. Since then pain has been constant, with several attacks. Worst attack ever experienced two months ago. Had chill, vomiting, and high temperature. Never has seen blood in urine. Pain is relieved somewhat when lying down, but is much worse when

wearing a corset or when working. Cystoscopic examination: Bladder mucosa normal. Mouths of both ureters normal, no evidence of stone. Pain was reproduced upon both sides, and was very sure that it was her old pain. Some pus from each kidney. Renal capacity of each kidney, 12 c.c.

Fig. VIII. Mrs. C. J., recumbent. Twenty per cent collargol injected into each kidney. Both in normal position. No evidence of inflammatory destruction. Plate taken previously shows no evidence of stone in either kidney or ureter.

Fig. IX. Same patient, standing, each kidney dropped about two inches, and each showing a definite kink close to the pelvis. Diagnosis: Double intermittent pyonephrosis, without destruction of the kidney substance.

Mrs. W., referred by Dr. Robert King, Denver, Colo. Waitress, age twenty-nine. Began four years ago with sudden pain in the appendix region, which extended down ureter and inside of right leg, to the knee. Some relief upon lying down. One year later appendix was removed and small ovarian cyst. No relief at all. Trouble was then pronounced to be due to adhesions and nervousness. Attacks have continued occasionally since, but more severe, and during the last six months patient has been practically an invalid, and is quite thin. Right kidney low down and very movable; left kidney not easily palpable. Urinary findings negative. Catheter met an obstruction 23 cm. from mouth of right ureter, but was able to pass it 5 cm. farther by manipulating the kidney up to its place. Left ureter 33 cm. Amount required to reproduce pain on right side 14 c.c; amount to produce a new pain upon left side, 10 c.c.

Fig. X. Mrs. W., recumbent. Left kidney normal and in normal position. Right kidney pelvis opposite third lumbar vertebra. Plate shows a

shadow parallel with and above the right ureteral catheter which we thought to have been caused by the patient breathing, but upon operation it proved to be a double ureter for six inches of its upper course.

Fig. XI. Same patient, standing. Left kidney dropped about one and one-half inch, showing a fairly definite kink close to the pelvis. Right kidney dropped nearly an inch farther and rotated on its anterior-posterior axis, and a definite kink shown about one and one-half inch below kidney pelvis. Diagnosis: Right-sided intermittent hydronephrosis. Advised a double nephropexy, for I thought it desirable to replace the left kidney to prevent future trouble there. Operation: Double nephropexy, double ureter on right side in its upper course. The lower ureter was adhered to the upper ureter, thus kinking both of them at the point as shown by the radiograph. Uneventful recovery, with complete relief to date, seven months later; has now been working for four months, without the least difficulty.

Mrs. S., housewife. Referred by Dr. Spivak, Denver, Colo. Trouble began about four years ago. Pain in right side of abdomen, came on suddenly, has been more or less continuous ever since, with occasional exacerbations. Relief obtained somewhat by lying down or rest in bed. Pain recurs, however, with any hard work or heavy lifting. Urinary findings negative. Right ureter, 35 cm. long, left ureter 36 cm. Ten cm. into right gave a pain which she declared to be the old pain, and eight cm. gave a new and different pain in left kidney.

Fig. XII. Same patient, Mrs. S., recumbent, both kidneys approximately in normal position and normal in appearance.

Fig. XIII. Same patient, standing, left kidney dropped about one and one-fourth inch, but no evidence of obstruction. Right kidney is markedly

prolapsed and rotated upon its anterior-posterior axis and somewhat upon its vertical axis. A distinct kink is present. Diagnosis: Right-sided intermittent hydronephrosis, without pathological change in the kidney. Advised operation. Not yet accepted, but has had at least one attack since. This patient had considerable pain upon injecting for the plate while standing.

Mrs. D. From University of Colorado Medical College Dispensary. Housewife. Mother of seven children. Has had an occasional severe pain in region of right kidney for several months, lately it has been almost continuous. Tenderness in this region. Was cystoscoped and catheterized, bladder and urinary findings negative. Upon injecting 10 c.c. into right kidney she declared it gave her the same old pain.

Fig. XIV. Same patient, Mrs. D., standing, both kidneys normal, with no evidence of ureteral obstruction upon either side, but the picture does show a considerable amount of an osteomyelic deposit upon the right border of the second, third and fourth lumbar vertebræ, which certainly was sufficient to give pressure upon the nerve roots as they came from the vertebræ. Diagnosis: Osteomyelitis of the lumbar vertebræ. This is an interesting case, for had we accepted the statements of the patient that the pain from injecting the kidney was her old pain, and had we not investigated further with the collargol solution, we would have made a serious mistake, for the patient urged us to operate on her if we thought that it might give relief.

Mrs. C. R. G. Referred by Dr. Robert King. Housewife, aged twenty-five. Child, three years old. Has had occasional attacks of pain in left iliac region since birth of child. Attacks so frequent in the last four months has had to give up her housework. Lost twenty-five pounds. Pain comes on suddenly while working; is relieved usually by lying down. Passes

more urine after cessation of pain. Diagnosed and treated for supposed tumor of the ovary, for past three months. Examination: Pelvis negative. Right kidney very much prolapsed. Left kidney not palpable. Cystoscopic examination: Bladder negative. Urine from both kidneys negative. Upon injecting left kidney a new pain was produced with 15 c.c. Injecting the right kidney with 14 c.c. the pain was reproduced in the left iliac region.

Fig. XV. Patient recumbent. Left kidney in normal position and normal. Right kidney prolapsed and apparently congenitally misplaced, shows what proved to be a bifurcated pelvis and the ureter apparently too short to allow the kidney being brought back to its proper position.

Fig. XVI. Same patient, standing. Left kidney shows normal excursion, with ureter in gentle curves. Right kidney entirely within the pelvis and rotated upon its anterior-posterior axis so that its outer border is looking directly downward. Diagnosis: Right-sided intermittent hydronephrosis, producing left-sided pain. Without pathological dilatation or impairment of function. Operation: An adhesion was found between urerter and genito-crural nerve at level of fourth lumbar vertebra. Nephropexy was done. Patient entirely relieved to date, seven months later. Discussion: This case is an extremely interesting one from the fact that the pain was transposed to the opposite side and that no lesion was demonstrable on the left side. The transposition of the pain might be explained by the adhesion to the genito-crural nerve. The bifurcation of the kidney pelvis is interesting for its comparative rarity. Had this case been operated without the positive proof of the radiographic evidences of the lesion, one would have been very much at a loss to know which side to operate. It is one of the rare cases where the transposition of the pain has been definitely proven.

Conclusions. (1) The so-called typical symptoms of intermittent hydronephrosis are applicable only to the very late stages of the lesion, and are therefore useless and misleading.

(2) The etiology is based upon a more or less mobile kidney with a fixed point somewhere within the radius of its excursion, which acts as a point of suspension.

(3) That there is no such condition as "painless intermittent hydronephrosis."

(4) That the kidney is insufficiently supported, the etiology of which is obscure, or perhaps based upon several factors.

(5) This condition is often mistaken for stone in kidney, but is not difficult to differentiate radiographically.

(6) The older methods of attempting to use the capacity of the kidney pelvis and the reproduction of pain are not accurate and permit of error in far too many cases to make them basic.

(7) The method devised by the author is accurate and scientific and is extremely practical, is open to almost no criticism, and its findings are as plain to the layman as to the physician. It demonstrates the lesion as it is produced in the attacks. It removes the possibility of error between this lesion and any other in the belly. It shows definitely where the lesion is, and points out what must be done at operation. It thus shortens the operation and adds double surety to the procedure and is an eminently conservative measure It cannot, however, be done by everybody, for it requires considerable skill, and expertness with the cystoscope and X-ray.

(8) If properly used it will save all kidneys with obstruction in their normal physiological condition.

FRAGMENT OF GLASS IRRIGATING NOZZLE REMOVED FROM THE BLADDER WITHOUT OPEN OPERATION.

VICTOR C. PEDERSEN,
NEW YORK.

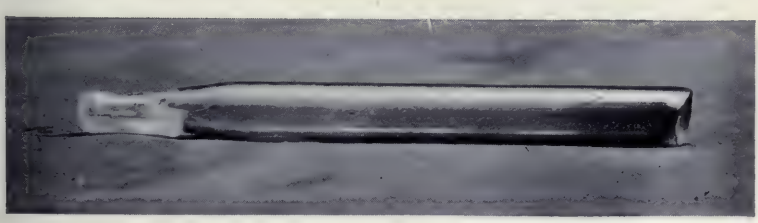
The following case may be of interest in illustrating the risk of glass irrigating nozzles used in connection with metal instruments about the cavities of the body.

A colleague in a suburban town telephoned me that he had broken off in a cystoscope the tip of the glass irrigating nozzle, and washed it into the bladder of a man during ordinary preparation of the bladder for cystoscopy. Upon my inquiry, he stated that he had seen the fragment with the cystoscope, and had, by filling the bladder, endeavored to have it washed out spontaneously. There had been no bleeding following the accident. I requested him to bring the patient into town at once without further intervention, but prepared to enter a hospital for operation, if simpler means failed to extract the offending fragment.

Upon arrival I verified his previous statements, and concluded that inasmuch as we were dealing with a more or less sharp fragment, as indicated by the large piece of the tip which he had brought, it was wiser not to subject the bladder to another cystoscopy for fear of stirring up various reflex renal phenomena, too well known to need mention. The calibre of the urethra was thirty French. I

therefore took the twenty-eight French size of Chismore's evacuating instrument, filled the bladder to the utmost capacity without pain, attached the suction bulb and began to pump. To my delight the fragment was felt to fall into the receiving bottle with the third suction. The bladder was then washed and filled again to the full limit with warm boric acid, which the patient evacuated, thus cleansing the bladder and urethra completely. No unfortunate results of any kind showed immediately or remotely, in fact, it is now eight or nine months since the incident occurred and the physicians have informed me that the patient is in every way well.

The photographs show the tip and the fragment assembled in the lying down position, and as separated in the standing position. The happy outcome of the case through management so simple, seems to excuse its publication. It is hoped that this little experience will be of service; first, in indicating the danger of endeavoring to use glass for connecting with metal instruments; second, in suggesting the great usefulness of an instrument like Chismore's evacuator in recovering small foreign bodies from the bladder.



AN INSTANCE OF ACUTE RETENTION DUE TO AN UNUSUAL CAUSE.

WILLIAM WARREN TOWNSEND,
RUTLAND, VT.

The reason for reporting this case is explained by the title; namely, "An Instance of Acute Retention Due to an Unusual Cause."

Mrs. H., aged sixty-five, the mother of five children, had been suffering for three weeks prior to May 2, 1911, with frequency and dysuria; these symptoms were treated by her regular medical attendant, with internal urinary antiseptics and antispasmodics.

On the morning of May 2, 1911, she was seized with severe pain in the left renal region, which necessitated repeated hypodermics of morphine to control. The following morning she was free from all pain and her physician and the surgeon he had in consultation concluded that the pain of the day previous was renal colic, due to the passage of a calculus. The freedom from pain the day following was ascribed to the fact that "the stone had passed to the bladder," and they proceeded to explore for it with a sound, with negative results other than that a frank hematuria followed the exploration.

From May 3 to the morning of May 8 (five days) she was free from pain and her condition was normal, except that urination was impossible in the sitting position, and could only be accomplished when lying in the supine posture. The urine remained macroscopically bloody. On the morning of May 9, at

six o'clock, she was seized with excruciating pain in the vagina, following an attempt at urination in the normal way. The pain as described by her, was of "a tearing, cutting, and bearing down character similar to that accompanying childbirth." Her physician found a mass of tissue presenting at the meatal opening. I was asked to see her and found the same condition, which resembled prolapsed urethral mucosa. Upon vaginal palpation the entire urethral area was found to be indurated. Sounding it with the tip of a metal catheter elicited a grating feeling and conveyed the impression that we had to deal with an impacted urethral calculus. Suffering greatly from acute retention, she was removed to the hospital, where, under anæsthesia, it was determined that the mass was soft tissue and not a calculus. Any attempt to dislodge it seemed to pull down the urethra with it, hence it was difficult to distinguish whether it was a new growth or necrotic mucosa. Manipulating with a metal catheter, I was successful in slipping by it into the bladder, and drew off a quantity of foul smelling, bloody urine. With the bladder empty it was apparent that the mass was not attached and I proceeded to deliver it by making counter pressure through the vagina and dilating the meatus. It measured two cm. by one and one-quarter cm. and was firm in consistence other than for superficial softening due to putrefaction. With the cystoscope a large growth on the posterior and left ureteral region was observed. Around the left ostium there was an area of ragged and bleeding mucosa corresponding in size to the portion of tumor removed from the urethra. In all probability the symptoms of acute hydronephrosis were due to the overgrowth of the ureteral meatus by it.

The specimen was sent to the laboratory and the following report was submitted: —

"The tissue is necrotic to such an extent that it is difficult to make out the finer structure, but its general structure indicates that it is carcinoma."

Operation was refused. The patient has since died and the above opinion has been confirmed.

To me the interesting features of the case are: —

First. As the woman never had any symptoms of bladder disease, up to three weeks before I saw her, it confirms our present knowledge, that new growths of the bladder may exist for some time without attracting attention by subjective or objective symptoms.

Second. It emphasizes the fact that acute hydronephrosis simulates renal colic due to a calculus, and I believe it is our duty to educate the general surgeon to an understanding that "renal colic" is not pathonomic of stone.

Third. It suggests that indiscriminate bladder sounding should be discouraged, as in new growths a portion of them may be broken off and occasion symptoms attended with great suffering and hemorrhage, as occurred in the above case.

DISCUSSION

OF PAPERS OF DRS. YOUNG, LEWIS, FOWLER, PEDERSEN AND TOWNSEND.

DR. W. F. BRAASCH, Rochester, Minnesota: I believe that anomalies of the ureter occur more frequently than is generally supposed. In a recent communication I reported thirty-six cases of congenital anomalies of the kidney and ureter. Among these were eight cases of duplication of the ureter on one side, and one case of duplication of the ureter on both sides. I have observed four cases of cystic dilatation of the ends of the ureter; all of them, however, with single ureters. The case that Dr. Young reports is of exceptional interest.

The cystoscopic method of removal of stones from the lower end of the ureter, as Dr. Bransford Lewis has outlined, should be tried more frequently, and I believe we will remove more by that method in the future than we have in the past. The procedure is not always as easy as it appears, and in many cases it will be quite impossible to remove the stone from below. In seventeen cases I have removed stones from below by various methods; six or seven by means of the Lewis operative cystoscope, and two by means of the Kelley cystoscope, which offers the best method of approach in the bladder of the female. If the stone be situated at or just above the junction of the bladder and the ureter, where the majority of stones in the lower ureter are found, it is usually impossible to remove it by means of the operative cystoscope unless the stone be very small and quite loose. It is possible that we may eventually be able to slit the bladder-ureter through the cystoscope and so be able to grasp these high-lying stones. Draper and I have recently conducted a series of experiments on dogs and have proven that slitting up of the lower end of the ureter will not (1) be followed by subsequent contraction, (2) it is not accompanied by great hemorrhage, and (3) there is no danger of ascending infection following destruction of the valve.

In regard to Dr. Fowler's paper: It is certainly a very interesting one. He states that if a pyelograph shows a so-called kink or twist in the ureter when taken with the patient standing, it is to be regarded as the cause of the patient's symptoms, whether or not there be any evidence of mechanical

obstruction in the ureter and pelvis. I have always been of the opinion that no movable kidney should be operated unless we could determine evidence of mechanical obstruction to the secretion of the kidney. I do not believe that any obstruction sufficient to be treated surgically could exist without consequent dilatation of the ureter and pelvis above. To demonstrate a kink in the ureter is not enough evidence to warrant operation. The pyelograph lends itself admirably to demonstrate early hydronephroses resulting from actual ureteral obstruction, even when they have a capacity as low as 20 c.c. Furthermore, it will be found that floating kidneys, which cause no symptoms, when radiographed will show these twists in the ureteral course. Changes in the course of the ureter are not of much practical significance unless causing mechanical interference, as demonstated by consequent distension.

In regard to the symptomatology of hydronephrosis, I have seen several cases without any pain. Anuria during the attack and polyuria following is not necessarily present.

DR. MARTIN WARE of New York: In conjunction with the case presented by Dr. Young I want to report an analogous one. Before doing so I will refer to the fact that these anomalies of the ureter were very clearly brought to our notice many years ago by Fenwick in his book, "Obscure Diseases of the Kidney," in which he described twelve or fifteen cases which he entitled ballooning of the lower end of the ureter. He also points out that most cases were duplication of the ureter. He made a distinction between the prolapse of the ureter at the time of the passage of a stone and the greater degrees of prolapse which eventually terminated in the condition of a cyst at the lower end. These pictures showed also how difficult it is to recognize the true measure of the cyst because the ureteral orifice may lie on the farther side so that you cannot see it.

A young man presented himself to me for a condition which was very evident. Cystoscopy was out of the question. He had pyuria. Introducing an instrument, we encountered a very large calculus. The X-ray showed that it filled the entire bladder. He had harbored it for seventeen years. I opened the bladder and found the stone occupied the entire bladder, so that I had to deliver it from a pocket as one would deliver the fœtal head. He made a good recovery except that a small suprapubic fistula and pyuria remained. In making a further search for the cause, I suspected calculus of the kidney, and I found that there was a calculus on the right side of the course of the

ureter which on further study with skiagraphy, opaque catheter and collargol, proved to be a dilated cystic ureter harboring a calculus.

DR. GEORGE K. SWINBURNE of New York: In regard to Dr. Pedersen's case, I think it well to relate an experience of my own. I had a glass nozzle that I used to fill up the bladder with. Because it was thin brittle glass I covered it with a rubber tip. One day, as I was cystoscoping a patient on whom I had used this tip to fill the bladder, I saw in the bladder a triangular piece of glass. I removed the cystoscope and put in a Chismore evacuating tube and pumped it out, without any difficulty. After it was out I showed it to the patient.

I was very glad to hear Dr. Braasch say what he did in regard to the non-necessity for operating on all cases of movable kidney. I have seen very few cases, but I have had three. One was a young woman who in swimming had dislocated her right kidney. It went on for several years. She was losing weight, and had marked neurasthenic symptoms when she came to me. She said she had noticed that if she lay down after meals she could digest her food perfectly and was all right, but if she moved around she would have an attack of vomiting. On examination I found a kidney which could be easily replaced. I was then associated with Dr. Alexander and he was doing some work on movable kidney. I suggested operation. She said no, she would not have anything to do with an operation. I advised her to go to bed and stay there. She was put to bed under the care of a trained nurse and kept there for four weeks, with forced feeding, and while she was in bed she gained twenty-five pounds in weight, and the kidney has always remained. A curious thing was that about a year later her sister, who had grown very thin, found a tumor on her right side and came to ask me about it. I did the same thing with her and the kidney has remained.

Another case came under my observation. A young woman at school had severe pain on the right side. A surgeon was called in and pronounced it appendicitis. A normal appendix was removed and she continued to suffer for four years. She then came into the hands of another surgeon who anchored the kidney. She still had severe pain, and I catheterized that kidney and found a pure urine, but loaded with epithelial cells. I told them to keep her in bed for a while, and in about two weeks' time she was up and around and was entirely well afterwards.

DR. HORACE BINNEY of Boston: I would like to say a word in connection with Dr. Lewis's paper. I was very much interested in his method of intra-vesical removal of stones in the lower end of the ureter. I should like to mention one case that emphasizes the need and importance of this method. The patient was a young man in the Boston City Hospital, who was admitted with a history of left renal colic. I was asked to cystoscope him. I passed a catheter into the left ureter, and met an obstruction about an inch and a half above the opening. At a subsequent sitting I put in a catheter with a wire stylet in it, and thought it slipped by the obstruction. An X-ray was taken with the styletted catheter in place, and a faint, small shadow was found just above the bladder, close to the stylet, but not actually in contact with it. The surgeon operated in the left inguinal region, extra-peritoneally, but was unable to find any stone. The patient made a good recovery, and about a week after his discharge from the hospital came to the outpatient department, where I was on duty then, and said that he had had a slight attack of renal colic the day before and had passed the stone, which he brought with him. I was indebted to him for doing so, because I felt that it was up to me to show that that shadow was a stone, as I thought.

We ought all to practice this, and ought to convice the medical public that this method is efficacious, and that patients with these maladies should be given a chance for this procedure before they undergo a major operation.

DR. HOWARD W. BEAL of Worcester, Mass.: I wish to endorse the paper of Dr. Lewis. Several years ago I removed two stones from the ureters through the cystoscope (by dilatation of the ureteral orifice). I think this method is very much neglected in our work, and in the coming years will be generally used.

The first case was that of a woman who had been gradually losing weight and strength for a number of weeks, and was thought by her family physician to be in a very serious condition. She was brought to the hospital, and on examination a stone was found to be impacted in the right ureter. On trying to reach the stone with a pair of forceps it was pushed farther back into the ureter and beyond the reach of the finger in the vagina. I dilated the orifice with a pair of forceps. The pain ceased, and she passed the stone the next day. She began to improve in condition, and has been well for several years since. That was evidently the only source of her symptoms.

The other case was a man fifty years old, a farmer, who had had pain in the left side four months, with more or less purulent urine. The first time I cystoscoped him I found a stone in the left ureter. The surgeon on duty refused to operate on him because he was a poor operative risk. So under ether I attempted to remove the stone through the cystoscope. There was a great deal of edema around the ureter, and from the orifice poured a snow-white mucoid material which coiled up in the base of the bladder. In attempting to reach the stone through the orifice there was considerable bleeding, and I lost the stone in the manipulation. I dilated the orifice so much that I partially ruptured it. I could see the rupture in the orifice, and the bleeding from it. From the symptoms the stone had been impacted four months, accompanied with disabling pain. The pain had disappeared when the patient recovered from ether, and he passed the stone from the urethra within forty-eight hours. Here was a serious case which the surgeon refused to operated on, in which the stone was removed by the cystoscope. I think that in all cases with stones in the lower ureter, dilatation of the orifice should always be attempted before surgical interference.

DR. C. E. BURFORD of St. Louis: Two years ago a general surgeon requested me to cystoscope a case for him. The patient had had some symptoms. He requested me to be very careful not to manipulate very much, for fear the stone would pass out into the bladder. I secured a very good picture, and it showed a stone. He proceeded to do a lower ureter operation and removed a stone about the size of a half grain of wheat. I have often thought that stone could have been gotten out much more easily.

We have all seen stones in the bladder with vesical irritation, and with contracture of the vesical neck. I believe that in cases where the stone has been in the lower ureter for a long time we will get the same condition, and I have seen two or three cases where there seemed to be unusual obstruction to a No. 6 or 7 catheter. I think it is very important in these cases to stretch the ureter opening wide, which is not done by the ureter operation. So I believe we have two or three logical reasons, outside of the one mentioned of the great risk of the operation, for attacking a stone in the lower ureter through the bladder. I have seen the ureteral orifice stretched wide a number of times, and I have never seen any severe inflammation following it. I believe the best results in dilating can be secured by

an alligator instrument, because the conical instrument will not dilate where we want it. I have had one stone which presented in the ureter orifice.

DR. J. H. CUNNINGHAM, JR., of Boston: In connection with Dr. Lewis's paper, we must all feel every time that we operate for stone in the lower part of the ureter that we are doing a formidable operation. That stones are very lightly held in the ureter I think is evidenced by the fact that so many start from the kidney and pass into the bladder. Also, that the mere passage of a catheter by a stone in the ureter often dilates the ureter sufficiently so that the stone passes. I have not used Dr. Lewis's instrument, but in view of the fact that there are some of these stones that I could not dislodge by dilating the ureter with the ordinary catheter, I advised a small catheter (No. 6), which has a conical metal end which when passed by the stone is forced out, leaving a shelf which may catch on the stone and dislodge it as the catheter is withdrawn. Please do not understand from anything I may say that all stones can be removed with this instrument. I think they cannot. But I do think it is a means by which we can remove some stones, and I believe that it is simply one of the little things that we may use to get a stone out through the natural channels, which should always be attempted before we undertake any such extensive operation as is required to remove a stone from the ureter.

DR. WINFIELD AYERS of New York. In regard to getting these stones out, there is just one little point that I want to bring up, and that is the manipulation through the vagina and rectum. All you need to do in a large number of cases is to change the position of the stone to have it pass, and in almost all men you can reach the lower portion of the ureter, and by a little manipulation can usually change the position of that stone so that in a few hours out will come the stone. I have removed sixteen stones from the lower portion of the ureter, and only three times have I had to use a pair of forceps.

DR. G. KOLISCHER of Chicago: I rise to discuss the method which Dr. Lewis is employing. He was kind enough to mention me among those who employed cystoscopic manipulations for removal of ureteral calculi. Let me tell you the truth about it. I introduced ureteral sounding and the injection of albolene or oil through the ureteral catheter into the ureter as one of the means of diagnosing and of removing ureteral stones, and

that I did for the first time eighteen years ago. At this time I discussed these methods thoroughly before the Vienna Medical Society. Thus my method was taken by up Caspar, Kreps, Schmidt and others, and I was given credit for it. Dr. Lewis must be aware of all that, because I called his attention to it two years ago at the meeting in Chicago, of the Northwestern branch of the A. U. A.

While I am having the chance of addressing this meeting I would like to take up another feature of Dr. Lewis's article. If one names an instrument after himself, if he proclaims himself as an inventor, he can rightfy do so only if he developed a new principle. Now there exists in fact only one cystoscope, and that is the Nitze cystoscope, and the only one who added a principal feature to it was Brenner, who, as the first one, added a conducting canal to this instrument. All other cystoscopes are only imitations or modifications of these instruments. It would be an act of gross ingratitude toward the father of modern urology, Nitze, to forget or to suppress these facts.

As a differential diagnostic problem I would like to ask Dr. Lewis or any other man to point out any difference between what Dr. Lewis calls and advertises as Dr. Bransford Lewis's operative cystoscope and the modification of Brenner's cystoscope that I devised, described and began to use in 1893. This instrument was again described in Casper's text-book, in Schauta's text-book in 1897, in my text-book on the diseases of the female bladder and urethra, 1898. *Sapienté sat.*

DR. YOUNG: There is nothing to say about my paper. I want to thank Dr. Ware for bringing up that interesting case. In regard to the removal of calculi from the lower end of the ureter, I agree that we ought to use the intravesical cystoscopic methods. I myself have invented an instrument, but I am almost afraid to own it here today. By means of this intravesical rongeur I have had some very interesting stone cases. There have been two cases in which I have caught stones in the ureter and pulled them out with it. One recent case was quite interesting, because the stone was quite large, and there was a constricted band of mucous membrane over it. I first caught the band of mucous membrane which surrounded it, and bit away with the rongeur a portion of the constricting band, and then caught the stone and pulled it out. This rongeur can also be used to go into diverticula to remove stones. In three cases I have taken them out through the urethra. An interesting case last week

was a man who had a cyst at the prostatic orifice, and it was quite easy to catch the cyst and pull it out.

Here is also a blade of a lithotrite which had been broken off in the bladder, which I removed with this rongeur. It is not applicable to all cases of incarcerated ureteral calculi, and these little instruments to be used with a catheterizing cystoscope which have been described from time to time are available for such purposes. I believe we are going to come more and more to the endo-vesical removal of these stones, and that endo-vesical or cystoscopic surgery is going to have an increasingly greater usefulness.

DR. LEWIS: I think it is only a principle which we wish to establish in this thing, and which has been enunciated by several of the gentlemen in discussing it. It has a place among the methods of removal of ureteral stone that has not been accorded heretofore, and that is all we wish to claim and all that is to be claimed. As I said in the paper, you take the general surgical writings, even by men who stand highest in the surgery of the country, and they fail to give any recognition to these methods. They ought to have this matter called to their attention. A number of these writers will tell you that if the stone is lying toward the lower end of the ureter it is best to go in suprapubically and dilate the strictured orifice of the ureter, thus promoting the extraction or the expulsion of the stone. If you can do that without making a suprapubic operation your patient is that much ahead. If you can get the stone out by these less serious methods certainly it ought to be done. If the surgeon is not able to make use of cystoscopic methods it is still not justifiable for him to subject his patient to an abdominal operation if the stone is removable by those methods. I am exceedingly gratified to hear the very generous and pronounced endorsement of this position, as indicated in the discussion.

DR. FOWLER: Dr. Braasch said he thought it was not necessary to operate on all floating kidneys. I do not think so either, and that is just why I developed that method. I do want to know what ones to operate on, and I want some method to determine that. I haven't the opportunity of the large clinics that some of you have. I want to know what method you are going to use to diagnose these cases from the normal. I certainly do not believe in operating on all kidneys. Ten years ago they were operating everything. Now if you operate on a floating kidney they almost say you are a fakir. Some floating kidneys do give

symptoms. In the presence of a demonstrated kink and symptoms I will operate, and to date I have relieved all those cases by operating. I intend to go on operating all that I can demonstrate as having symptoms and an obstruction.

Dr. Swinburne spoke of floating kidneys. Floating kidneys have nothing to do with kinks except in connection with an aberrant vessel. Some cases can be relieved by putting to bed. He said one patient got fat and then he could not find the kidney. As a matter of fact, I think extreme fatness is an etiological factor in floating kidney.

Dr. Ware spoke of Dr. Fenwick's work. I have gone over that. It concerns itself with the diagnosis of dense kidneys and torsion. As far as I can find in the literature, nobody has ever shown kinks in pelves that have a capacity as low as fourteen c.c. There are cases with very high capacity. As far as I can learn, the procedure of standing patients on their feet has never been used before in these cases of hydronephrosis. It is a method of almost unlimited application. If Dr. Braasch will be kind enough to send me all the cases he refuses by the pelvic content method I will pay their fare to Denver and work them out. I will go over them and see what I can make out of them. I wish some of the men who are working in these large clinics would present some method of diagnosing these cases before they go on suffering from one to five or ten years and become neurasthenics. Why do you turn down these cases that are so serious? You have implanted a neurotic condition on top of a hydronephrosis, and sometimes a mental condition that is harder to cure than the hydronephrosis. I have never treated them for appendicitis, ovarian trouble or pleurisy, and I have gotten relief in all the cases I have operated after demonstrating the lesion.

THE MICROCOCCUS CATARRHALIS AS A CAUSE OF URETHRITIS IN THE MALE.

WINFIELD AYERS,
NEW YORK.

At the November meeting of the Genito-urinary Section of the Academy of Medicine I read a paper on "The Micrococcus Catarrhalis as a Cause of Inflammation in the Genito-urinary Tract." This appeared in the March number of the American Journal of Surgery. Owing to the small number of cases observed since first recognizing the m. catarrhalis in urethritis I am compelled to incorporate some of the cases already reported and the first three of this article will also be found in my other paper.

Only one of the text-books on genito-urinary surgery that I have consulted mentions the fact that the m. catarrhalis is found in the male urethra — and this one only slightingly. Nearly all authors state that the presence of Gram-negative diplococci in the pus cells is sufficient evidence on which to make a positive diagnosis of gonorrhœa. Yet nearly all state that a culture is advisable in medico-legal cases. Bacteriologists also hold practically the same view. Wood is the only one who states that the m. catarrhalis is sometimes found as a cause of urethritis. Neither Hiss and Zinsser, McFarland, Park and Williams, Jordan, nor Mallory and Wright mention that this germ may cause inflammation of the male urethra.

Microscopists are willing to make a positive diagnosis of gonorrhœa by microscopical examination of pus from the urethra, but they wish it distinctly

understood that there is a possibility of error amounting to as high as five per cent. In my opinion the cause of error is the m. catarrhalis, as no Gram-negative diplococci other than the gonococci and the m. catarrhalis have been demonstrated in the urethra. The course of inflammation and the treatment is so entirely different, it is important to differentiate one from the other at the earliest possible moment, and a differential stain would be welcome.

As described, the individual cocci of the m. catarrhalis are more rounded than those of the gonococci; they are not so apt to be crowded together in pus cells, and more are found extracellular. It will be remembered that as gonococcic urethritis begins, a smear shows more extra- than intracellular organisms, but as inflammation progresses, extracellular germs become fewer, only to proportionately increase as inflammation subsides. In m. catarrhalis urethritis extracellular germs predominate until near subsidence of infection, when practically all are found intracellular. Yet at times a smear from a gonococcic urethritis looks absolutely like a m. catarrhalis, and vice versa, and in the writer's opinion it is utterly impossible to morphologically differentiate these two organisms.

At present our only method of differentiation is by culture. The gross appearance of colonies of m. catarrhalis differs from that of gonococci; and in addition m. catarrhalis will grow on nutrient agar, even at room temperature, and gonococci will not. Several other micro-organisms found in urethral discharges will grow on nutrient agar and it is necessary to examine microscopically anything which may appear. For the practitioner, extensive cultures are not necessary. An inoculated tube of nutrient agar may be kept at room temperature, or what is better, carried in the waistcoat pocket, if an incubator is

not available, and so soon as any growth appears it should be examined. If Gram-negative diplococci are found a diagnosis of m. catarrhalis urethritis may be made, but if none are found and Gram-negative diplococci were discovered in the urethral discharge, a diagnosis of gonorrhœa must be made.

Because very little has been written about the m. catarrhalis, and that little hard to find, I have copied from "Studies on Meningitis," by Wm. J. Elser and F. M. Huntoon: —

"*Cultural Characteristics of the Micrococcus Catarrhalis.* — Grown on ascitic agar plates this microorganism exhibits in the main two distinct types of growth.

"Type 1. When the organism assumes this type of growth, the well isolated colonies appear as somewhat raised, opaque, grayish-white discs, measuring after twenty-four hours incubation from one to two millimeters in diameter and presenting a slightly irregular, moderately glistening surface. Examined with a reverse ocular the outlines are irregular, often having a jagged appearance resembling in this respect certain pseudo-diphtheria colonies. Examined with a low-power microscope, these colonies present numerous irregular crumbs on the surface. They are yellowish-brown in color, relatively opaque and are characterized by very abrupt, irregular jagged margins. Probably the most striking feature of this growth is its peculiar, brittle, 'mortar-like' consistence, which serves to distinguish it from certain pseudo-diphtheria colonies which it resembles inmany respects. It bears no resemblance whatever to the meningococcus or gonococcus colonies, but might be mistaken for certain of the chromogenic Gram-negative cocci when the color produced by the latter is slight.

"After forty-eight hours' incubation, these colonies are somewhat larger and on a very rich medium attain

the size of that of a fully developed meningococcus colony. Moreover, the irregular jagged margin is now visable to the naked eye.

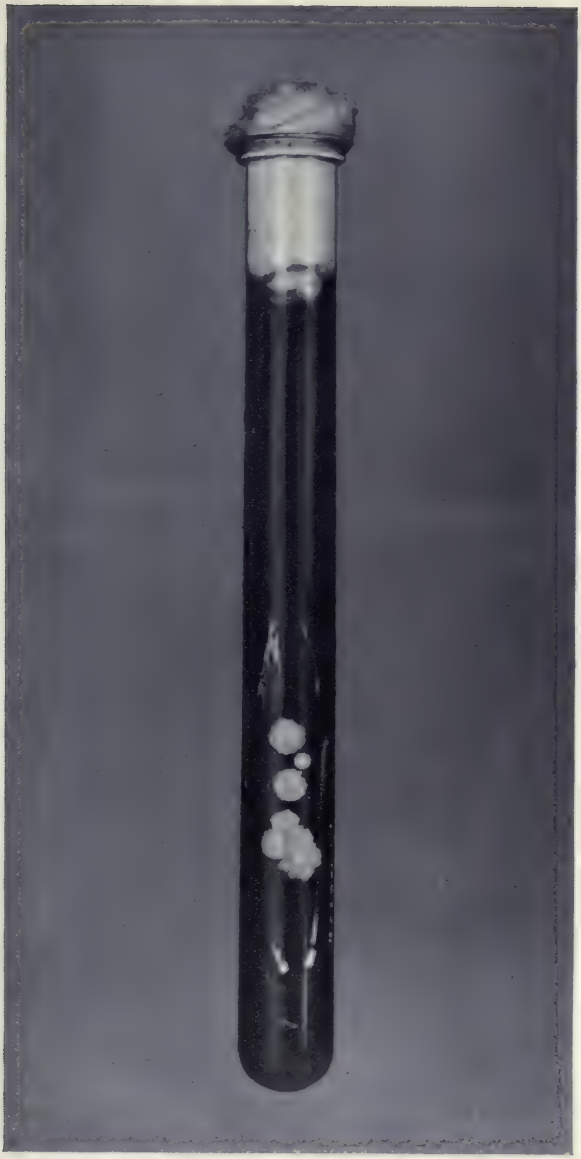
"Type 2. This type of growth does not appear as frequently as the preceding. It differs markedly from the type described above and closely resembles a miniature meningococcus colony in appearance.

"After twenty-four hours' growth it appears as a rather flat, gray, translucent disc, measuring from three-fourths to one millemeter in diameter. The margin of the colony is fairly distinct, the surface is smooth and fairly glistening. In consistence it resembles that of a meningococcus colony. Very frequently the central part of the colony is a trifle more opaque than the periphery and has a faint yellowish-white tint. Microscopically it bears a striking resemblance to an incompletely developed meningococcus or gonococcus colony. It presents fairly distinct smooth outlines. The central portions are covered with moderately coarse crumbs. The peripheral portions are somewhat homogeneous in appearance. The crystaline deposits referred to in connection with the meningococcus colony have never been observed, even after four days' growth at incubator temperature.

"After forty-eight hours have elapsed a slight increase in the size of the colony is noticeable, not associated, however, with any appreciable change in its appearance.

"What we have just said concerning the colony characteristics of the micrococcus catarrhalis applies only to the recently isolated organisms. If a recently isolated strain showing the growth designated as Type 1 is transferred to a second ascitic plate, after repeated transfers the colonies may have all assumed the features enumerated under Type 2.

"Furthermore, in the course of artificial cultivation the growth of this organism becomes more and more



luxurient and the individual colonies gradually attain the size of a fully developed meningococcus colony. At this stage of their development colonies of Type 2 can no longer be distinguished with certainty from those of the meningococcus grown on the same medium. While slight differences still exist they are not sufficiently pronounced to serve for the purposes of differentiation. The very characteristic brittle consistence of the colony has wholly disappeared. When transferred to fluid medium a stable suspension is, however, not formed, in which respect they differ from the meningococcus. In the course of our work we have encountered only two exceptions to this rule."

Case I. W. C., age, twenty-eight; came to the office September 22, 1911. His first attack of urethritis began in March, 1911, and he was pronounced cured after four months of treatment. On September first he noticed an urethral discharge — thirty days after his last connection. He immediately consulted his physician, who, on the microscopical findings, made a diagnosis of reinfection by the gonococcus. Argyrol was used and the patient became steadily worse, and was referred to me. On examination I found a very long foreskin; a V-shaped meatus considerably reddened, but only moderately swollen; a profuse purulent discharge, and a large amount of pus in all three specimens of urine. (He stated that there was no burning at all on urination.) A smear from the meatus showed immense colonies of extracellular Gram-negative diplococci, and though many pus cells contained the same organisms, none was crowded with germs as is so customary in gonorrhœa. Further examination disclosed a prostate normal to touch, but a distinct inflammation of the right vesicle. The history of thirty days' incubation,

absence of burning on urination, the microscopical picture and the reaction to argyrol indicated strongly a m. catarrhalis urethritis. All local treatment was stopped and he was given santal oil. Culture on nutrient agar, kept at room temperature, showed a typical growth of m. catarrhalis.

On September 25 there was much less discharge and less pus in his urine. Rectal examination showed bilateral vesiculitis.

On October 29 there was no discharge, but his urine contained a very large amount of pus. The globus minor of the left testicle was swollen. A deep instillation of fluoride of silver was given.

On October 14 there was no discharge and his urine was clear to the eye. The swelling in the scrotum increased in size. It did not involve the globus major, but extended up behind the testicle and was connected with it only at the globus minor. It was about one and one-half by one inch in diamater and was adherent to the skin of the scrotum like a tubercular abscess. The right vesicle had decreased in size, but the left was as thick as a man's thumb. The patient's temperature was normal.

On October 28 his testicle was nearly normal in size, but a moderately heavy discharge had reappeared. He also had considerable pus in all three specimens of urine. His vesicles had decreased in size and a large amount of pus was expressed from them on massage.

On November 3 there was only a slight discharge. Up to this the microscopical picture had remained fairly constant, but a smear on this date looked so absolutely like gonorrhœa that a second smear was taken and sent to Dr. Sondern, who pronounced it gonorrhœa. To prove that gonococci were absent culture was taken on nutrient and blood-agar from the meatus, from the sedimented urine and from the

prostatic fluid obtained by massage. Dr. Sondern reported micrococcus catarrhalis and coli in all, but found no gonococci.

On December 6, scrapings from the meatus showed no pus nor bacteria; his urine was microscopically free of pus, as was also his prostatic fluid. He was therefore discharged as cured.

He returned on February 19, 1912, because for four days he had noticed a slight moisture at his meatus. A smear showed a very few pus cells and innumerable minute Gram-negative cocci. Culture failed to develop either m. catarrhalis or gonococci, but did grow these chromogonic cocci. He is still under treatment.

Case II. Mr. S. came to the office in 1905 suffering from chronic urethritis. He was entirely cured and from the time of his discharge until March 2, 1911, had had no urinary trouble whatever. On February 27 he had met a former mistress and over-indulged sexually. Three days later he noticed an urethral discharge and immediately came to me. On inspection his meatus was seen to be normal with the exception of a fairly heavy muco-purulent discharge. A smear of this showed very many Gram-negative diplococci, mostly within pus cells. His urine contained a surprisingly small amount of pus, considering the free discharge. A culture on nutrient agar was taken and he was given caps. stearosan. Culture showed a growth of m. catarrhalis.

On March 4 there was no discharge, but scrapings from the urethra showed a little pus and a moderate number of Gram-negative diplococci.

On March 7 his urine was microscopically free of pus and no germs could be found in scrapings from his urethra. He was discharged as cured.

No local treatment had been employed.

Case III. Dr. M., age, fifty; had never had venereal disease. Early in May, 1910, his urethra was badly traumatized, the principal injury being to the prostatic portion. From that time until July, 1911, he suffered constantly from pains referable to the prostate. Defacation or erection decidedly increased his pain. At times he noticed a mucous discharge from his penis, especially after a hard movement of the bowels. In July he found his discharge had become purulent and quite profuse. This followed and was perhaps excited by excessive use of his automobile, his work compelling him to be in his machine almost constantly for over a week. As he had had no sexual intercourse for over a year because of painful erections, he thought he had simple urethritis and began taking large doses of oil of santal. As this did not check the discharge he came to the conclusion he had infected himself from his hands, as he had had numerous cases of gonorrhœal vaginitis to treat just previously. He came to the office on the fifth day of his discharge. I found a moderately heavy purulent discharge; the meatus not swollen and the lips not everted; and, considering the duration of inflammation, a very small amount of pus in his urine. Under the microscope very many Gram-negative diplococci, almost entirely intracellular, were found. These corresponded absolutely to the picture of gonococci, but because of the history and the lack of swelling of the meatus a diagnosis of m. catarrhalis urethritis was made. A culture on nurtient and serum-agar was taken. The growth showed m. catarrhalis and no growth resembling gonococcus was found.

As he had been taking oil of santal for five days with no appreciable benefit he unquestionably required local treatment and his urethra was irrigated with a very mild solution of silver nitrate. The following

morning his discharge was slightly lessened, but partly because the diagnosis was not yet certain and partly because I wished to verify my opinion in regard to the newer silver salts in these cases, I filled his urethra with freshly dissolved argyrol, fifteen per cent, and held it there for ten minutes. In the afternoon his discharge was decidedly increased and the silver was again employed. The following morning the flare-up caused by the argyrol had subsided and silver was continued. After this, inflammation subsided quite rapidly, but massage of his prostate brought away considerable pus. Examination of this showed an occasional Gram-negative diplococcus. Three weeks from the time of his first visit his urine was microscopically free of pus and there was no pus in his prostatic fluid. All his old prostatic symptoms had disappeared. He was kept for two weeks under observation and then discharged as cured. I have seen him a number of times since and can find nothing wrong with him.

Case IV. Mr. P., age forty-five, came to the office November 25, 1911. He has had five or six attacks of urethritis, the last one in 1903. The majority had been mild, but the last required about one year to cure. From 1903 until the above date he had been entirely free of all urethral troubles. He stated he had had no sexual intercourse in over a month, but had noticed a slight discharge the previous evening. Inspection disclosed a purulent discharge and a reddened, though not swollen meatus. Gram-negative diplococci were found in the pus cells — very few outside. His urine contained a rather heavy sediment of pus. From the clinical appearance and the microscopic picture it seemed to be a case of gonorrhœa, but the history of one month's incubation was against it. A culture on nutrient agar was taken and the patient was given stearosan.

On the 27th there was very much less discharge, but no growth had appeared on nutrient agar which had been kept at room temperature. A culture was taken on blood-agar.

On the 30th the patient's condition had changed very little. Growth had appeared on the nutrient agar and was found to be m. catarrhalis. Blood agar also showed growth of coli and m. catarrhalis, but no gonococci.

The patient required a little local treatment and was discharged on the 16th of December.

Case V. Mr. S. came to me November 11, 1909. At that time he had a tubercular testicle on the right side, and which I subsequently removed. He had never had venereal disease. In April of 1911 he developed an urethritis seven days after exposure to infection. This, though mild at first, proved very obstinate and in August he came to New York to consult me. I found a slight discharge which contained Gram-negative diplococci — no culture was taken from the urethra. He had a swelling of the left testicle, very similar to that of Case I. His prostate was markedly swollen and his left vesicle was fully an inch in diameter. There was no fever or other general disturbance. As the prostate was palpated, pus began to flow from his urethra — fully a drahm was collected on a watch crystal. This was found to contain very many Gram-negative diplococci and on culture proved to be m. catarrhalis. There was no growth of gonococci. The patient returned to his home in the northern part of the state and I have been informed he has entirely recovered. I recommended stopping all local treatment.

Case VI. Mr. C. came to the office on Jan. 2, 1912. His first urethritis began six weeks before —

twelve hours after copulation. (Previous copulation, four weeks before.) He discovered his trouble just before he was to leave St. Louis and ran in to see Dr. Bransford Lewis. There was no time for microscopical examination and Dr. Lewis prescribed protargol one-half of one per cent, advising him to see a doctor at his next stopping place. Discharge almost ceased, only to return slightly, and the patient consulted another doctor. A careful microscopic examination failed to disclose any Gram-negative diplococci and a diagnosis of simple urethritis was made. From that time until he came to me he used his injection whenever he found a discharge, but when there was none treatment was discontinued.

I found a slight watery discharge which contained a little pus and a moderate number of Gram-negative diplococci entirely intracellular. Culture proved these to be m. catarrhalis. The patient had prostatitis and seminal vesiculitis and made a slow recovery. He is still under observation, but no treatment is being employed.

After examining a large number of smears from my cases and finding that the microscopic picture usually corresponded with written descriptions of the m. catarrhalis, I came to the conclusion that by careful study of a smear one could often make a positive diagnosis of m. catarrhalis infection. I found I was wrong, as the following case will show.

Case VII. Mr. F., student, came to the office on Jan. 16, 1912. He had had connection eight days previously, and had had an urethral discharge for three days. It was his first attack of urethritis. There was no redness nor swelling of his meatus, neither was there the slightest irritation on urination. On examination of the smear immense numbers of extracellular Gram-negative diplococci were seen

and those pus cells which contained germs were not at all crowded with the organisms. The individual cocci seemed less rounded than is usually the case in gonorrhœa. The diagnosis, both clinical and microscopical, was m. catarrhalis urethritis. Culture proved it to be gonococci infection.

Etiology. In all probability inflammation may be caused by hematogenous or direct infection. There can be little doubt but that in Case III origin was through the blood. Quite possibly also Case IV. In the others infection was undoubtedly direct — incubation being from one to five days.

Clinical Symptoms. In the cases observed inflammation has always begun as a subacute condition. There has been little redness or swelling of the meatus; discharge purulent, but not profuse; little if any burning on urination; and the urine has contained a surprisingly small amount of pus, considering the amount of discharge. The latter is not a constant symptom. A smear from the meatus shows Gram-negative diplococci, intra- and extracellular, sometimes appearing exactly like a smear from gonorrhœa.

Course of the Disease. There is a tendency to quick recovery if active local treatment is not employed. If santal oil is given, inflammation will subside, in some cases, within seven days. If, on the other hand, frequent urethral injections of any of the newer silver salts are employed, inflammation rapidly intensifies and after a few days much resembles an obstinate gonorrhœa.

Complications. Any or all of the local complications which may occur in gonorrhœa may supervene on a m. catarrhalis urethritis which has been improperly treated. But with the complications we rarely find the systemic disturbances so common in gonorrhœa when infection of the testicle, prostate, seminal

vesicles, bladder or renal pelvis occur. One may find the prostate or vesicles intensely swollen and full of pus with no systematic disturbance whatever. An epididymitis is far less painful and usually has not the characteristic swelling of gonorrhœa. I have seen one case of supposed m. catarrhalis pyelitis. There was a temperature of 103, but inflammation quickly subsided under administration of urinary antiseptics. In the same case the cystitis was very mild.

Diagnosis. It is to be differentiated from gonorrhœa and this can only be done by culture. Both have Gram-negative intracellular diplococci in smears from the meatus. In gonorrhœa the germs crowd the pus cells, while in m. catarrhalis they do not, as a rule. However, we not infrequently find m. catarrhalis pus looking exactly like gonococcic, and vice versa. Micrococcus catarrhalis grows on nutrient agar at room temperature and gonococci do not. For clinical purposes it is only necessary to prove the m. catarrhalis present to exclude gonorrhœa in any case of short duration. In cases of long standing it is best to take a culture on blood- or serum-agar in addition. A culture on nutrient agar kept at incubator temperature will show growth of m. catarrhalis in twenty-four hours, but when kept at room temperature nothing shows for forty-eight hours and sometimes for four days.

A patient presenting the classical symptoms of gonorrhœa — namely, a heavy, purulent discharge, ardor urinæ, swollen meatus and Gram-negative diplococci crowding the pus cells is without question a true gonorrhœa and no culture is needed in making a diagnosis. But if these acute symptoms be lacking diagnosis is not so easy. Considerable importance should be placed on the elapsed time since the last copulation. Should it be three to ten days, infection is probably gonococcic, but should it be one day or more than

ten days one should be very suspicious of m. catarrhalis. On the other hand, even should a urethritis develop many weeks after copulation one must always take into consideration the possibility of anti-infection and also the fact that many patients do not hesitate to make false statements to physicians.

Prognosis. If no treatment is employed, inflammation tends to persist indefinitely, never becoming very severe. If too active treatment is instituted it only serves to aggravate inflammation and nearly all the complications known to gonococcic urethritis may supervene. On the other hand, if it is treated properly a quick recovery with practically no discomfort to the patient is the result. A cure may be expected in from one to three weeks.

Treatment. It is of course impossible on the first visit to make a diagnosis of m. catarrhalis urethritis. Twenty-four or more hours will elapse before one is certain. It is best in those cases in which there is a probability of catarrhalis infection — cases in which there is a history of three or more weeks incubation — to give nothing but santalwood oil. If inflammation begins as subacute type and there is an incubatory period of about five days we are probably dealing with a gonococci infection and in these cases it is wise to use a mild astringent. If it proves to be gonococcic such treatment is of decided benefit, and if it proves to be m. catarrhalis, we have done the best for the patient.

Frequency of Occurrence. Out of thirty-two cases of uerthritis presenting Gram-negative diplococci, taken at the Post-Graduate Dispensary, one was found to be the m. catarrhalis. Out of twenty-two at the office, six were m. catarrhalis urethritis.

In mild cases of m. catarrhalis, oil of santal is all that is required to effect an absolute cure in from seven to ten days. In the more severe cases a mild local astringent is often needed.

In regard to the newer silver salts, I have not experimented with any except argyrol. This I consider worse than nothing. In Case VI protargol in a mild solution seems to have been of benefit. Whatever local treatment is employed it should be mild.

REPORT OF A CASE OF GONORRHŒAL PYELITIS.

LOUIS C. LEHR,
WASHINGTON, D. C.

A case of pyelitis in which the gonococcus was obtained in pure culture came under my observation about five months ago.

The literature on this subject is comparatively slight, embracing in all about twenty cases. In five the gonococcus was only obtained from the voided specimen. In two the pyelitis was due to a mixed infection. In four no cultures were obtained. In one a nephrectomy was done and the diagnosis made from the specimen. In four the disease was only recognized at autopsy. In only four were cultures obtained from the kidney during the course of the disease.

There are certain features about this case that I think of special interest, and I think it shows the possibility that this complication of gonorrhœa may be more common than the comparative scarcity of the literature would indicate.

The report of my own case is as follows:—

The patient, a male, aged twenty-seven, came to me on November 6, 1911, complaining of a urethral discharge and painful micturition. He had two previous attacks of gonorrhœa in 1903 and 1905, but as far as could be made out these attacks were confined to the anterior urethra, recovery being prompt and without complications. Otherwise his genito-urinary history was negative. He had never had typhoid,

Bright's, or any disease that would favor such a condition. His present attack began on October 5, while returning from Europe, and was treated by the ship's doctor by internal medication only. Marked improvement took place, and he thought he was well. On November 3 the discharge reappeared, with marked frequency of micturition. He was referred to me on November 6 by Dr. S. Logan Owen.

On examination a scanty, purulent discharge was present, and smears showed pus cells and numerous Gram-negative diplococci. Urine voided in three glasses contained pus and diplococci in all three. Albumin was present, but in no greater quantity than could be accounted for by the presence of pus. No casts were present. Terminal hematuria marked; external genitalia normal. On rectal examination the prostate and seminal vesicles seemed normal; no enlargement or tenderness present. Carrying the index finger beyond the prostatic notch, no induration or tenderness could be made out. Temperature 100, pulse 84. The patient was put to bed, potassium citrate and tincture of hyoscyamus prescribed, and hot sitz baths, and the frequency and pain on micturition controlled by rectal suppositories. This condition persisted for about two weeks, after which the hematuria and pain gradually subsided. The patient was then put on deep injections of argyrol ten per cent. Improvement was steady, although the urine still contained pus and diplococci. The patient left town for three days, and while away indulged in alcohol, with the result of an acute exacerbation, accompanied by hematuria and great frequency. This acute condition lasted for about one week, and the patient was again put on deep injections of argyrol, and later posterior irrigations. Rectal examination showed apparently no involvement of prostate or seminal vesicles. After the subsidence of

the acute symptoms the patient declares he suffered no pain or inconvenience of any kind, although the urine continued to contain a large amount of pus and diplococci. Temperature normal, pulse normal.

The patient remained in this condition until January 20. Two days before that the bladder was washed out with a strong solution of silver nitrate, which produced little or no pain, and no change in the character of the urine. From this I thought it probable that the pus had its origin from some other source than the bladder, prostate or posterior urethra.

A cystoscopic examination was made on January 20. The instrument was introduced without difficulty or pain, and the following picture observed: —

The mucous membrane of the bladder showed signs of inflammation over its entire surface. The capillaries were slightly dilated, and the membrane appeared yellowish-red in color. This inflammation was possibly more marked about the region of the trigone. The ureteral orifices appeared normal; no reddening or signs of inflammation surrounded them. Prostatic edge showed no inflammatory changes. From the left ureteral orifice pus and urine were seen escaping with each contraction of the ureter, while from the right ureteral orifice apparantly normal urine was expelled. The left ureter was catheterized and cultures made.

Bacteriological Report. On January 22 two tubes of serum agar made of one part filtered ascitic fluid and three parts beef infusion agar with a reaction of + 1 were used, after the cultures were made. The tubes were incubated over night and the next morning the surfaces were covered with fine dew-drop-like colonies. Incubation was continued another day and there was no change in the general appearance of the growth except that the colonies became larger. Transplants were then made to ordinary beef-infusion agar and

serum agar. No growth of any kind occurred on the plain agar, while the serum agar showed again a characteristic appearance. Smears stained by Gram showed a pure culture of a Gram-negative diplococcus.

On March 4 two tubes of ascitic fluid agar and two of plain agar were inoculated and remained entirely sterile. — Bacteriological examination by Dr. Henry J. Nichols, U. S. A. Medical Laboratory.

On January 24 the patient was injected with fifty million of a stock vaccine and on the 25th twenty c.c. of a ten per cent solution of argyrol was injected into the pelvis of the kidney — twenty c.c. being about the capacity of the left pelvis. The next day the urine was markedly improved, although it continued to contain much pus and diplococci. An autogenous vaccine was prepared at the U. S. Army Medical Laboratory and seventy-five million dead organisms injected; at the same time twenty c.c. of a thirty per cent solution of argyrol was injected. No improvement followed, and on February 5 — six days later — the patient was given one hundred million organisms from the autogenous vaccine. No reaction followed the injection of the vaccine, and no improvement of the urine was observed. The patient was now left alone for eight days, with the exception of vesical irrigations, and any change in his condition observed. During this time the amount of pus and the number of organisms present in the urine steadily increased.

On February 15 the patient was cystoscoped and the same condition of subacute cystitis and purulent urine escaping from the left ureteral orifice was observed. The ureter was catheterized, and twenty c.c. of a one to three thousand solution of silver nitrate injected. Slight improvement.

On February 20, five days later, pelvic lavage was given, a small ureteral catheter being used (No. 5

French), and two hundred c.c. of a one to five thousand silver nitrate solution injected. Owing to the small size of the catheter used, the solution could easily be returned alongside of the catheter, and by leaving one cock of the cystoscope open (a Brown-Buerger catheterizing cystoscope being used) the nitrate solution was allowed to escape from the bladder.

The next day the urine was microscopically clear, but still contained some pus.

On February 23 pelvic lavage was again performed with a solution of one to three thousand nitrate, and again on February 26, three days later, with a solution of one to two thousand five hundred. On February 28 the urine was examined and except for a few small shreds in the first glass — which contained pus but no organisms — was clear. The left ureter was catheterized and cultures taken on two tubes of ascitic fluid agar and two of plain agar. All four tubes remained entirely sterile. The treatment was discontinued and the patient was observed until March 12, when he had to leave for his home in the West, at which time the urine still remained clear and free from pus and organisms.

I think we are justified in looking on this case as a pure pyelitis, with little or no involvement of the kidney structure, because of the complete and rapid recovery and the absence of any kidney elements in the urine.

The infection in this case was most probably by continuity or by means of the lymphatics, or both, owing to the lack of all complications and systemic symptoms, which would most probably have arisen had the organisms entered the general circulation; and further, most authors hold that in infection of the kidney by means of the blood current the cortex would be primarily involved.

The interesting features on this case seem to me to be: —

The insidious onset of the disease, without any symptoms referable to the kidney.

The severity and duration of the posterior urethritis and cystitis, and, as mentioned, the lack of fever and toxic symptoms.

The fact that the infection though severe was confined to the mucous membrane of the urinary system, and involved none of the deeper structures.

The lack of result of vaccine therapy, at least in this case. (This I think may be due to the fact that the infection was limited to the surface of the mucous membrane of the pelvis where the vascular supply is slight. Better results might be expected where the infection involved the cortex of the kidney with its rich vascular supply. I did not prolong this form of therapy longer, as gonococcus vaccine acts quickly or not at all.)

The little result derived by injecting argyrol or silver nitrate into the pelvis of the kidney in small quantities, and the excellent results of large quantities of a comparatively weak solution of silver nitrate when injected as described, accompanied as it is with the least possible chemical and mechanical irritation.

FURTHER EXPERIENCE WITH LIQUOR ALUMINUM ACETATE IN COLON BACILLUS INFECTION OF URINARY TRACT.

IRVIN S. KOLL,
CHICAGO, ILL.

Since the presentation of my initial paper on this subject, now seven months ago, it has been my privilege to personally see eight additional colon infections of the urinary tract, and to have communication from my colleagues, who report sixteen cases successfully treated.

Of my eight cases, five were urethritis, all following an acute gonorrhœa, the colon, however, obtained in pure culture; two cystitis, and one pyelitis, all pure colon infections.

An average of thirty-one days for all cases was necessary to obtain a sterile urine. In no instance was there any local irritation worth noting.

Of the sixteen cases treated by the various members of the Association, all report favorable results, but some have not given the liquor long enough trial in order to give a sterile urine. These sixteen cases consist of six pyelitis, nine cystitis and one urethritis.

In checking up the twenty-seven cases previously reported, I have been in personal communication with sixteen of the patients. From five of these I have obtained specimens of urine under the most careful aseptic precautions, from which cultures have been made under the supervision of Dr. J. W. Jobling, director of the Michael Reese Hospital Research Institute, and each of these specimens found to be

free from colon bacilli. Unfortunately, the remaining eleven cases are not within my reach. There have been three recurrences, one cystitis in a man eighty-four years of age, with a relaxed bladder having from twenty to fifty c.c. of residual urine. A prompt instillation with the liquor aluminum acetate has on two occasions prevented any further subjective manifestation. Another cystitis recurrence is in a female, twenty-four years old, who has complained of frequency and tenesmus for ten years. After four and one-half weeks of treatment, her urine was sterile, her tenesmus gone. At the time she was first seen her bladder showed a diffuse ulcerative cystitis. Now, eighteen months after her discharge, she returns with the story of a returning of frequency and slight tenesmus. Her urine gives a pure culture of colon bacilli. She is now under a second course of treatment. Urine from both kidneys was sterile. The third recurrence was in the urethra, and may have been a new infection, since there had been recent exposure.

I find, in carefully analyzing my correspondence upon this liquor treatment, that many complain that there is very severe irritation following the instillation into the bladder. Personally, this has been encountered in but two instances, which were promptly controlled by opium suppositories. The following preventive procedures are suggested against such unpleasant encounters: First, the preparation of the liquor is of great importance. The National formulary should be followed very closely: —

Aluminum Sulphate (U. S. P.)	300.
Acetic Acid (U. S. P.)	300.
Calcium Carbonate	130.
Water	1000.

Dissolve the $CaCo_3$ in the acid mixed with 250 c.c. water, and the aluminum sulphate in 750 c.c. Mix the two solutions and allow the mixture to stand

twenty-four hours, agitating occasionally. Pour off the clear solution and filter. The solution contains seven and five tenths to eight per cent of basic aluminum acetate.

After the full strength solution is prepared, I advise diluting each time the liquor is employed, because unless a very carefully distilled water is used the carbonates of the water will throw down a heavy gelatinous precipitate of the aluminum hydroxid, which will leave free acetic acid.

A second suggestion that may be of value is to start with one per cent in severely inflamed bladders, and in each case control the irritation with opium suppositories. One thing is absolutely certain: You *cannot* produce any anatomical injury. This point was carefully ascertained before putting my experiments [1] to practical application. I doubt that any drug that has ever been used on the inflamed mucosa of the urethra and bladder has failed to produce some irritation, and in most instances where the colon bacillus has been the offending organism without any definite end results.

This leads to the point of differentiation between a clinical and a bacteriological cure. I am sure that all will agree with me that the point of satisfaction is not reached until the urine culture is sterile. How many urologists have failed to get repeated recurrences in their colon infections of the renal pelvis and urinary bladder? I venture to state that all have had such annoying experiences. Many times a case is discharged as cured as soon as the clinical picture has faded, or, at latest, when the leucocytes have practically disappeared from the urine. The bacilluria remains, and as long as it does remain, just so long does that patient run the risk of a recurrence. Many recurrences of cystitis in the same individual

[1] Am. Jl. Urology, Nov., 1911.

will surely produce an involvement higher up, be it hematogenous, lymphogenous, or by direct extension, which latter condition I am beginning to seriously question as being of frequent occurrence. Many recurrences of a pyelitis will almost certainly produce destructive pathology in the kidney parenchyma.

Comparison with the experimental work of many observers gives the liquor aluminum acetate superiority over other drugs in their germicidal and antiseptic properties upon the colon bacillus. The most recent work is that of Clark and Wylie,[1] who found that it requires a two per cent solution of silver nitrate to destroy a culture of colon bacilli. No one would care to introduce such a strength of the nitrate into the bladder or kidney.

Many urologists claim, and in most instances quite correctly, that it is more the drainage produced by the ureteral catheter than the effect of any drug that relieves the pyelitis, yet I am of the conviction that the most efficient germicide that will produce the least change upon the tissues will materially aid in giving the quickest and best ultimate results.

Permit me to resound Dr. Tenny's [2] warning that in persistent or resistent cases of cystitis, due to any organism, look for involvement higher up in the urinary tract.

In view of the fact that in the hands of others, together with my own cases, forty-two patients suffering from colon infections of the urinary tract have been absolutely cured, and that these cures have been bacteriological as well as clinical, may we not accept liquor aluminum acetate as efficient in combatting this ever-increasing disturber of the kidneys, bladder and urethra?

---

[1] Clark and Wylie: J. A. M. A., July 29, 1911.
[2] Tenney and Chase: Trans. Am. Urol. Assoc., 1911, p. 111.

Author's New Cases.

Sex.	Age.	Location of Infection.	Length of Time to Produce Sterile Urine.	Remarks.
Male.	38	Anterior urethra.	Five days.	Followed closely on disappearance of gonococci.
Male.	30	Anterior urethra.	Forty days.	Bacilli disappared from discharge in three days.
Male.	22	Anterior urethra.	Fifteen days.	Bacilli disappeared from discharge in thirty-six hours.
Male.	25	Anterior and posterior urethra.	Three months.	Urethral fistula following gonorrhœal abscess.
Male.	27	Anterior and posterior urethra.	One and one-half months.	Recurrence or reinfection, two months following previous attack. Urine was sterile when discharged first time.
Female.	29	Left kidney pelvis.	Ten days.	Paraplegia. Chronic diffuse ulcerative cystitis, with complete retention.
Female.	58	Bladder.	Fourteen days.	Spontaneous urination began third day after treatment was started.
Female.	65	Bladder.	?	Patient left hospital three days after treatment was begun. Marked frequency and tenesmus, which was greatly relieved in twenty-four hours.

Contributed Case Reports.

By whom Treated.	Location of Infection.	Results.	Remarks.
MacGowan, G.	3 Pyelitis.	"Culture still obtained at end of ten and twelve weeks."	All improved beautifully, though colon still present. Vaccines used. Pure culture in each case.
	5 Cystitis.	Four still under treatment.	"Only one case pure culture, which grew worse, now better but not cured with $AgNO_3$. Vaccines used in all cases."
Bremmerman, L. W.	3 Pyelitis.	Sterile urine in seven weeks.	"These cases responded beautifully following the first two to three treatments, but after that the condition was difficult to control."
Corbus, B. C.	1 Cystitis.	Sterile urine in two months.	"Has some pathology in bladder, probably neoplasm. Unable to cystoscope on account of severe hemorrhages."
	1 Urethritis.	Still under treatment.	"Has greatly improved under three weeks' treament."
Ravogli.	1 Cystitis.	Completely cured.	Infected his bladder with a catheter.
Young, W. G.	1 Cystitis.	"Sterile urine after three to four instillations."	Recurrence in few days, probably due to involvement in prostate.
Murphy, A. I.	2 Cystitis.		One showed improvement, other did not respond; both have passed into other hands.
Gardner, J. A.	2 Urethritis. 1 Cystitis.		In all three cases got so much reaction and pain that the treatment was given up.
Rawls, R. M.	1 Pyelitis.	Five irrigations covering period of five weeks.	Periods between irrigations had to be weekly, on account of difficulty in passing cystoscope. Positive culture obtained at end of five weeks.
Schram, D. L.	1 Cystitis.	Sterile urine in three weeks.	First time sterile urine obtained in five days; relapse of cystitis required three weeks more to obtain urine free from the bacilli. Has remained so since.

DISCUSSION

OF PAPERS OF DRS. AYERS, LEHR AND KOLL.

DR. J. L. BOEHM of St. Louis: I would like to talk on Dr. Ayers' paper concerning infection with the micrococcus catarrhalis. I believe the Doctor said in conclusion that the only cardinal point in the diagnosis was in culture. In the Cornell pathological laboratory in this city they have done some very good work with the micrococcus catarrhalis. As I understand it, I believe it is accepted by bacteriologists that there are ten varieties of Gram-negative diplococcus, foremost amongst which are the meningococcus, pseudo-meningococcus, gonococcus and micrococcus catarrhalis. The micrococcus catarrhalis, besides making a culture, demands one thing, and that is, the effect on the sugars, the fermentation test, on levulose, maltose, dextrose, lactose, etc. I think that is a very essential point. I do not remember having heard the doctor mention that, and I think that that should be accentuated. In order to make a differential test between the gonococcus and micrococcus catarrhalis it is absolutely essential to have a sugar medium in order to show fermentation or non-fermentation. The micrococcus catarrhalis is negative and does not affect the sugars, while the gonococcus affects them, causing a fermentative reaction with maltose and levulose.

DR. EDWARD L. KEYES, JR., of New York: Permit me to compliment Dr. Ayers on his paper. Every paper that is read before this (or any other) Association insisting upon the many possibilities of error in gonococcus diagnosis, and urging the physician to mistrust his ability to diagnose the gonococcus in chronic urethritis simply by making a smear and looking at it under the microscope (often without the Gram) is very much to the point. Yet it is also possible to overestimate the importance of the micrococcus catarrhalis. Inasmuch as Dr. Ayers did not make his own bacterial diagnoses, I know he won't mind my saying that I think he has got too many bites. I have seen one case that I believe to have been caused by the micrococcus catarrhalis (diagnosed by Prof. Elsner of Cornell, who is particularly interested in Gram-negative diplococci). That was a simple urethritis of no great severity. On the other hand, I have had a great many cultures made, mostly from chronic

cases to be sure — very few acute cases — and I have never seen another case of micrococcus catarrhalis infection. I think, in view of the great difficulties of this diagnosis, it is conceivable that in some of these cases at least the doctor has let the laboratory man lead him astray.

DR. AYERS: I would like to say a word in regard to Dr. Lehr's case. I consider he is very fortunate in getting as good results as he did. I have washed out a large number of cases of gonorrhœal infection of the kidney, — and I have not had a hundred per cent of cures, by any manner of means. It is only a small percentage, about five or ten per cent of the cases, of gonorrhœal pyelitis, that I have benefited at all. I have one case under my care now that I have been washing out for eight years twice a week — bilateral gonorrhœal pyelitis. The reason I keep it up is because every time I stop treatment for about two months the patient gets up an acute cystitis so that he cannot work.

In regard to diagnosis by the culture method: We all have met cases which would not respond to treatment as we expect them to respond under anti-gonococcic treatment. Those cases have bothered me a great deal. I have been trying to develop the diagnosis between the two to find out what it was, and I found my laboratory report came in catarrhalis. I have been hunting through the literature as much as possible, but these valuable reports are buried in hospital and clinical records and are hard to find.

It is stated by all bacteriologists that the gonococcus will not grow on nutrient agar at room temperature, and in every one of my cases I have obtained a growth on agar at room temperature, and there has been no growth of the gonococcus on the proper media; which would seem to prove that the organism was not the gonococcus, and if it is one of the fifty-seven varieties of the Gram-negative diplococcus that we have, I shall be glad to know what they are. I have classified them as the micrococcus catarrhalis, from the several cases I have sent over to Dr. Sondern. He has always pronounced them as that, and I am relying on his diagnosis.

DR. FRANCIS R. HAGNER of Washington: I want to say a word about Dr. Lehr's paper. I enjoyed hearing it very much. I reported a case a little over a year ago myself. I think it is very unfortunate that Dr. Ayers has not reported his. A year ago there were only seventeen cases in the literature, and some

of those cases are unquestionably doubtful. I collected in all seventeen in my series, and probably four or five of those were doubtful. I cannot help but believe from Dr. Ayers' cases that he must have had double infections, that do not get well, because it has been the experience of every man who has had these cases that they recovered promptly under treatment unless there was destruction of the kidney structure complicating the pyelitis. My case recovered after three injections of the pelvis with nitrate of silver. I used a stronger solution, a one per cent solution, and not so much. After three injections the patient's urine was absolutely free of pus. He only lived about eight months after he recovered (he was drowned), but up to that time he had had no return. In all these cases that have been irrigated — Dr. Lewis', Dr. Lehr's and my own — recovery has been prompt. Dr. Ayers says he has had one case that lasted eight years. I think he ought to report it. There are several cases of mixed infection, but I think Dr. Lehr's is the eighteenth case in the literature of pure gonococcus infection.

THE EFFECTS OF URETERAL LIGATION, EXPERIMENTAL AND CLINICAL.

J. DELLINGER BARNEY,
BOSTON, MASS.

During the past three years the writer has been carrying on experimental work in the Laboratory of Surgical Research at the Harvard Medical School, on the effects of sudden and complete occlusion of the ureter by ligature in animals. The results are of importance and interest, but as the work progressed it became evident that the problem was of such magnitude that its various aspects would have to be dealt with separately.

As experimental work is of value chiefly for its bearing upon human problems, it follows that any such investigation must be viewed quite as much from the standpoint of the clinic, as of the laboratory. The results of experimental ligature of the ureter are so uniform and so striking, that we have sought to compare them with those of a similar procedure in man. Also, as we have already pointed out in our forthcoming paper on experimental work, the statements of textbooks are not only conflicting, but largely erroneous. It is in the hope that an analysis of a fairly large group of such cases will settle at least some of the aspects of this problem that this paper is written. For this purpose the literature was searched with some care, and thirty-two cases answering our requirements have been gathered, many of these having been already collected by Sampson of Albany. Through correspondence with most of the representa-

tive surgeons and gynecologists of this country we have gathered thirty more cases.[1] With a total of sixty-two authentic cases of sudden and complete occlusion of the ureter by the ligature or clamp, we feel that deductions from them will be of value.

Of these sixty-two cases the ureteral injury was unilateral in forty-six, bilateral in sixteen, the large majority occurring in the course of a hysterectomy, vaginal or abdominal. In forty-eight the ureters, one or both, were ligated with or without division; in seven the obstruction was produced by a clamp. As by the latter method the ureteral lumen is as suddenly and completely closed as by ligature these cases have been included.

The ureteral injury produced no immediate symptoms whatever (except, of course, anuria in those of double occlusion) in twenty-six cases, or forty-one per cent. Of the unilateral cases ten, or twenty-one per cent, had no symptoms referable to the injury, either immediate or remote, and all made a full recovery. Were it stated in the reports how long after operation these patients had been followed we might be obliged to modify the figures. The only one about whom we have definite information died nine months later of recurrent malignant disease (for which the original operation was done), and during this time there was nothing to call attention to the injured ureter.

As we see anuria not uncommonly from interference with the function of one kidney either by calculus or other process, this condition was hopefully sought for in the cases of unilateral injury. It occurred but

[1] Our gratitude for their courtesy was expressed at the time to those surgeons and gynecologists who contributed material. As the cases are not to be given here in detail it seems unnecessary, and, in some instances, a breach of confidence to record the names of these gentlemen. The writer wishes, however, to assure them again that his sense of gratitude is none the less keen.

once, the patient dying after thirty-six hours of acute uremia. The rarity of its clinical occurrence is striking, but is entirely in accord with our experimental results. Of thirty-three animals, seven rabbits and twenty-six dogs, whose ureters were ligated, the reno-renal reflex, as evidenced by anuria, did not occur in a single instance.

Anuria was present, as was to be expected, in all of the bilateral cases, and was the only symptom. Its duration was variable, but in no case was it allowed to continue for more than ninety-six hours. In the latter, and in another after forty-eight hours, a double nephrotomy was performed. Urine was secreted freely in each case, but death occurred in the one after forty-eight hours, and in the other after twenty-four hours. In the others the operator, realizing what had happened, restored the continuity of the ureter by the removal of ligatures or clamps, or by anastomosis. That his attempt to lift Nature to her feet was not always successful is shown by the high mortality of thirty-three per cent. And yet one cannot say that the suppression of urine alone was the determining factor. In none was it long drawn out, and as a matter of fact, this condition may exist for a much longer period of time before death ensues. Morris mentions a case of anuria of seventeen days duration, while another surgeon, with whom we corresponded, saw in consultation a patient who had passed no urine whatever for twenty-three days. Both ended fatally, but they serve as proof that the human system can sometimes make good resistance to this particular onslaught. In the series of cases under consideration the high mortality must be ascribed to other factors, such as severe and prolonged operation in a patient already below par, and to whom the ureteral injury was merely the last straw.

In animals we have found that after the elimination of one kidney by the ligation of its ureter, the urine

from the healthy side is at first somewhat decreased in amount, but within a few days a compensatory secretion takes place, and the urine may then equal or exceed its former quantity. Such is the case in man, although observations on this point are unfortunately scanty. In the unilateral cases a decrease in the urinary output during the early post-operative period was observed in ten (twenty-one per cent), while in two, in whom this feature was carefully watched, a subsequent rapid rise in the daily amount of urine was noted. In the absence of sufficient data on this point we must assume that of the ten cases in whom one ureter was shut off, and who made a complete recovery, the urinary secretion was at least sufficient to maintain life and health regardless of its quantity.

In two patients having one ureter ligated, the urine was bloody for two or three days after operation. It is possible that the additional work, and hence the increased blood supply of the healthy kidney, gave rise to this condition. In dogs whose urine was carefully examined before and after operation no hematuria was seen. We believe the source of the blood in the clinical cases to be the injured ureter, whose walls were bruised and crushed by the ligature. Whatever the cause, hematuria is evidently not common, and we record the facts for what they are worth.

So far as observations could be made, in dogs and rabbits ureteral ligation produced no pain or tenderness in the corresponding kidney. In the series under consideration, damage to one ureter gave rise to renal pain or tenderness, or both, in twenty-six per cent. We have not, however, found it remarked that the pain was severe, or protracted, or that the tenderness was more than fleeting. In fact in only one patient was the kidney more than a temporary source of complaint, and in this case the continuance of severe pain necessitated a nephrectomy.

It is significant that in no case of bilateral occlusion of the ureter was there any pain or tenderness in the kidneys. Whether this may be explained by an immediate and considerable reduction of the urinary output to which it may give rise, and as a result of which the renal capsule is not stretched, nor the pelvis dilated, we cannot say. We regard such a theory as adequate to explain the facts, and as we have been unable to find any reference to this question in our perusal of the literature, we offer it for your consideration.

In the cases of unilateral injury of the ureter we regard the production of renal pain and tenderness as evidence, with a firm experimental basis, of an immediate and intense renal congestion, with a persistence of the secretion of urine by the damaged organ.

Our observations and those of others, of the kidney whose ureter has been experimentally ligated, have shown this condition of the organ during the first few days after operation. With the formation and development of anastomosing vessels of the renal capsule with others (spermatic, ovarian, suprarenal, and lumbar), new channels are provided for the venous circulation, and the congestion gradually subsides.[1] Furthermore, the kidney, in spite of its handicap, continues to secrete urine for many weeks or months, and refills even though repeatedly emptied. In the absence of confirmatory data the occurrence of these phenomena clinically is uncertain, but we firmly believe that they occur at least in some degree, and we also regard them as the underlying cause of the renal pain and tenderness. Furthermore, by the same argument we can explain the cessation of these symptoms by the establishment of the vascular anastomoses already described.

---

[1] For a full account of such vascular changes in the kidney the reader is referred to our paper on "The Effects of Ligation of the Ureter; An Experimental Study."

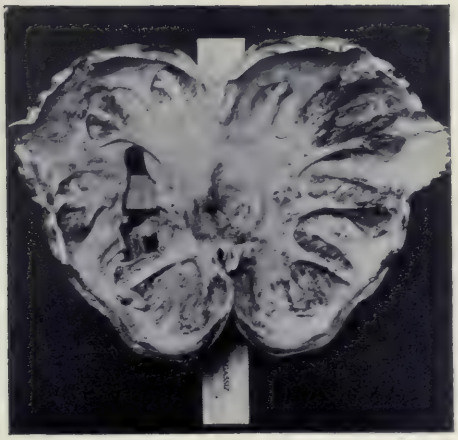
Contrary to the results obtained experimentally, ureteral fistulæ established themselves in twenty-four per cent, the urine choosing various points of exit, according to the nature of the operation, seeming to prefer the vagina, but not ignoring the laparotomy wound, or even the abdominal cavity. Our work in animals has taught us that a ureter once firmly tied remains closed indefinitely, even when it is not divided beyond the point of ligature. But as in animals we used ligatures of silk or chromic catgut, while in the human plain catgut seems to have been employed, the difference in the results may be thus explained. The ability of the ureteral lumen to re-establish itself is illustrated by the following case.

The right ureter was ligated at the pelvic brim with absorbable catgut. Above this point it was opened and drained for "some time" through an in-lying catheter. On removing the catheter urine drained freely into the bladder, showing that occlusion by absorbable ligature is not permanent.

It seems to us that this case illustrates a point of importance — namely, that if the ureter is intentionally ligated (as it was in some of these cases), the ligature should be of enduring material, such as silk or chromic catgut. Whether it is also divided is not essential. Observations in animals show that in a few weeks Nature replaces the ligature by a firm fibrous closure of the ureteral lumen, giving its extremity a club-shaped appearance.

As some investigators have declared that ureteral ligation in animals results in infection of the corresponding kidney, and as others have denied the allegation, we investigated this point in our own experimental work. Sterile cultures were obained from the urine of the hydronephrotic kidney in three rabbits, after intervals of three days in two, and fifteen days in one, and in two dogs at periods of six

A.



B.

Fig. 1.

Dog 6. Two hundred and forty-seven days after ligature of right ureter. This shows a most extreme degree of hydronephrosis 13 cm. in length. Compare the size of the two kidneys. Note great dilatation of pelvis and ureter. Lobulation well shown. During life enormous vessels anastomosed freely over the hydronephrotic kidney, but are not seen in the photograph owing to deposit of fibrous exudate over kidney, the result of perinephritic abscess and pyonephrosis from which the dog died. In A, near top of outer border of kidney, and in B, in center of left side, is seen the point at which rupture of sac occurred by necrosis. In B, note the extensive thinning of cortex, development of interlobular bands, and dilatation of pelvic outlet.

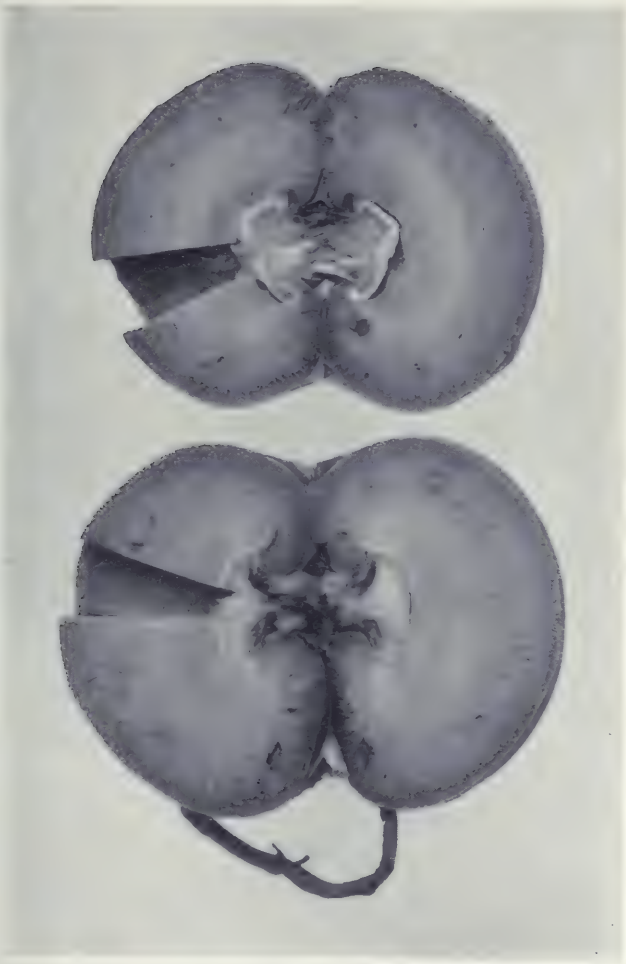


Fig. 2.

Dog 5. Eighteen weeks after ligature of ureter. Atrophied kidney above.

Note absence of dilatation of pelvis and obliteration of normal markings of kidney.

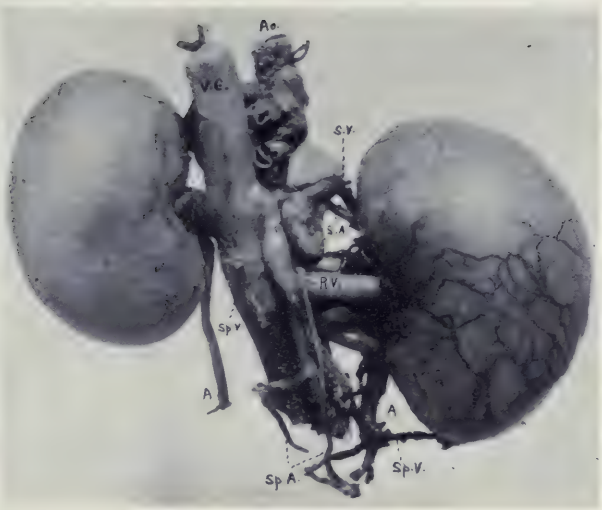


Fig. 3.

Dog 26. Eleven days after ligature of ureter. Male. Left hydronephrosis. Anterior view. Injection of vessels. Nephroptosis on left. Tortuosity of left ureter, A.

Note branch of spermatic vein, Sp. V., going to lower pole of kidney, and suprarenal vein, S. V., supplying upper pole.

V. C., vena cava; Ao., aorta; R. V., renal vein; Sp. A., spermatic artery; S. A., suprarenal artery.

No engorgement of vessels of right kidney.

Compare with posterior view, Fig. 4.

Photo by L. S. Brown.

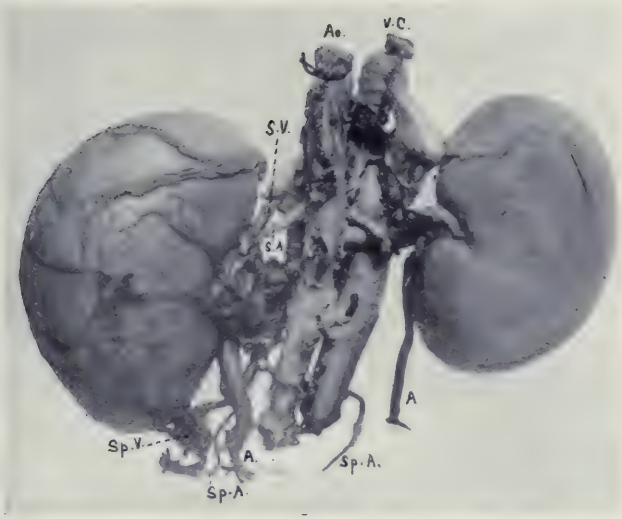


Fig. 4.

Dog 26. Eleven days after ligature of ureter. Male. Left hydronephrosis. Vessels injected. Posterior view. Shows size, number, and distribution of vessels on posterior aspect of kidney.

Compare with anterior view, Fig. 3.

Photo by L. S. Brown.

and twenty weeks after operation. In the others, with a few exceptions, the absence of infection of the renal sac must be granted if the constant good health of the animal, and the normal appearances of the urine and kidney are of any significance. But it is essential to realize first, that the urine of normal animals (at least that obtained from the kidney) is rarely if ever infected, and second, that the animal is selected for experimental purposes on account of its good health.

In man we are handicapped by the absence of one or both of these factors. The patient is generally below par, the operation still further lowers his powers of resistance, and finally, the kidney is frequently infected at the outset. This latter statement is made without corroboration from the history of our cases, but we regard it as an observation whose probability is great.

Renal infection after ureteral occlusion was noted in seven, or fifteen per cent of these cases, but occurred only in those of unilateral injury. We offer no explanation for its absence in the bilateral series. In the presence of damage to both kidneys its appearance would ordinarily be expected, but the facts do not show it.

All these seven infected organs were removed at varying periods after the primary operation, which with the nephrectomy necessitated by persistent pain and mentioned elsewhere, gives a total of seventeen per cent in whom the ureteral injury led to a subsequent nephrectomy.

Ligation or clamping of the ureter is therefore not to be regarded as the best means of escape from a difficult situation (as it evidently was believed to be in some instances), especially as the mortality of this procedure is found to be seventeen and eight tenths per cent. But, as was stated with reference to the

bilateral injuries, the mortality is not strictly that of the accident. Other factors, already enumerated, cannot be disregarded. We are convinced that if a perfectly normal individual were subjected to the comparatively simple operation of ligation of one ureter the mortality would be low, perhaps nil. Our opinion in this matter is based not alone upon the successful outcome of this operation in animals, but also upon the fact already stated, that of the forty-six clinical cases, ten, or twenty-one per cent, recovered without symptoms of any sort, while the others (about sixty per cent) successfully outrode the storms of convalescence even though seeking the shelter of a nephrectomy.

We have already remarked that one of our chief interests in this investigation was our ability to strike a parallel between clinical and experimental results. We have shown that hydronephrosis is an almost constant sequel of the experimental ligation of one ureter (Figs. 1, 3, 4), atrophy of the kidney occurring but once (Fig. 2) in a series of thirty-three animals. In this case there was no engorgement of the capsular vessels or evidence of their anastomosis with others. In all the hydronephroses these vessels were extraordinarily large and numerous, and their relation to others well marked, a feature which we have been able to show in photographs of injected specimens (Figs. 3, 4). We were thus led to the conclusion that hydronephrosis is dependent for its development upon the formation and growth of capsular vascular anastomoses. Clinical data on these points are sadly lacking. In only fifteen cases was the subsequent condition of the kidney actually observed. The paucity of material is, however, somewhat compensated for by its quality. In twelve (eighty per cent) hydronephrosis had developed, the size of the renal sac depending on the age of the

obstruction. In no instance was the condition of the capsular vessels noted. But as the ureter was released after ten days in the oldest case, and after six days, six days, and five days respectively in the others whose age entitles them to consideration, we must assume either that no vascular changes had taken place, or that the anxious surgeon, intent only upon the patient's welfare, was blinded to the scientific aspects of the situation.

In two cases note was made of the palpation of a large kidney some days after the accident, but the exact time is not stated. The case of longest duration was operated upon at the end of ten days, and a permanent lumbar ureteral fistula established. The record states that "the secreting part of the kidney was thinned out, forming the wall of a cyst possibly twelve inches in diameter." This has encouraged us to believe that such kidneys would be more frequently found it sought for.

Of the remaining twenty per cent we have no definite knowledge beyond the statement that "no change" had taken place in the kidney. Therefore from the data so far obtained, we must acknowledge that ligation or clamping of a ureter in man does not produce hydronephrosis of large size, although the case just cited shows that considerable dilatation may occur even after ten days.

In connection with the incidence of hydronephrosis it has seemed to us important to learn how long a ureter may be occluded without crippling the functional capacity of the kidney to such an extent that nephrectomy is indicated.

A review of the literature on this point reveals a confliction of opinions, and the statements of those with whom we corresponded leave us still more in the dark. In the presence of such disagreement the data gathered from this series is of value.

In the patient whose ureter was obstructed for ten days and who had a considerable degree of hydronephrosis, the kidney immediately resumed its function, and continued to secrete a large amount of clear, normal urine over a period of many years. Another kidney, whose ureter was released after six days, secreted normally. In a third case both ureters were ligated for forty-eight hours. At the end of this time the left ureter was released, and urine appeared in the bladder. The ligature was not removed from the right side until the sixth day, but then normal urine came from it and the patient made a good recovery. Again, in a patient whose ureter was ligated for five days, the kidney took up its work after the removal of the obstruction.

The facts are then that ureteral occlusion may exist for at least ten days without material harm to the kidney. With our recently acquired knowledge of renal function from the phenolsulphonephthalein test we shall be able to judge each case on its own merits. But we wish to emphasize a point much dwelt on by Guyon, Albarran, and other investigators, and which our own experimental work has taught us — namely, that after the release of a ureter long obstructed the kidney displays a remarkable recuperative power, and an organ which at first is apparently of little value will prove itself an important factor in the elimination of metabolic waste. Hence we urge the delay of a nephrectomy until the kidney is definitely proven useless.

The aim of this communication has been, first, to draw conclusions based, not on theories, but on facts, and second, to compare as closely as possible clinical and experimental observations. Our conclusions may thus be briefly summarized: —

1. Sudden and complete occlusion of one ureter may produce no symptoms whatever, and uninter-

rupted recovery may ensue in twenty-one per cent of cases, but, —

2. In the event of an injury to both ureters there is complete anuria in all, as is to be expected, whereas, —

3. In the unilateral injuries suppression of urine occurred in only one and six tenths per cent.

4. Ureteral fistulæ are developed in twenty-four per cent, their site depending upon the nature of the operation.

5. Where only one ureter is ligated pain and tenderness in the kidney, usually subsiding spontaneously, is to be expected in twenty-six per cent. It has not been found in cases of bilateral injury.

6. Infection of the kidney produced by the injury to the ureter, or aggravated by it, and necessitating subsequent nephrectomy, occurred in fifteen per cent.

7. Both ureters may be clamped for as long as seventy-two hours with complete recovery after removal of the obstruction, whereas one ureter may be completely blocked for ten days without destroying the integrity of the kidney.

8. Of fifteen patients in whom the subsequent condition of the kidney was investigated, hydronephrosis was observed in eighty per cent, but in no case was the kidney of more than moderate size. In the remainder there was said to be "no change" in the condition of the kidney.

9. The mortality of bilateral occlusion of the ureter is found to be thirty-three and three tenths per cent, whereas, —

10. In unilateral occlusion the death rate is seventeen and eight tenths per cent, but in both instances we must consider the influence of other factors, such as the previous condition of the patient, and the severity of the operation.

11. Our investigation of this series of cases shows (1) that there is strong probability that many a

ureter is ligated without the fact being known, and (2) that in the presence of post-operative anuria, and in the absence of localizing symptoms examination of each ureter by the cystoscope may be the only means of determining whether one or both ureters have been occluded.

A CASE OF MALARIA SIMULATING RENAL CALCULUS.

E. O. SMITH,
CINCINNATI, O

Mr. R. D., aged twenty-nine, married, living in Lexington, Ky., merchant, formerly lived in the country. Family history good, and pathological history negative. Never been ill. Habits good. Slender built.

On July 8, 1911, after feeling slightly indisposed for a short time, was taken suddenly with a severe pain in left side of abdomen, which after an hour or so, "settled" in the left lumbar region. Left abdominal muscles contracted and rigid. The character and severity of the pains were such as to suggest renal calculus. Next day there was macroscopic blood in the urine, continuing for a day or so. Opiates were given and pain gradually disappeared. He felt relieved for two weeks, when there was another sudden attack similar to the first, only more severe. He became incapacitated for work and was confined to his home. About the end of July he was seen by Dr. Barkley of his home city, who at once suspected renal or ureteral calculus. The patient had had at times some elevation of temperature but no chill.

Urinalysis, at this time, showed some microscopic hematuria, which rather strengthened the suspicion of stone. Dr. Wheeler introduced leaded ureteral catheters and radiographs were made, but no evidence of stone was found on the plates. The patient continued to suffer great pain almost continuously except

when large doses of morphine were given hypodermatically. On August 11, 1911, Dr. Barkley asked me to see the patient with him in the hospital in Lexington.

The patient gave no history of malaria, had never had a distinct chill and there was no periodicity of the paroxysms or attacks of pain. He had at that time a slight elevation of temperature and had lost about thirty pounds in weight during the last five weeks.

The findings upon physical examination were practically negative. Spleen could not be felt. In view of the fact that he had been so carefully examined by Dr. Barkley and his associates, I felt that there was no calculus causing the symptoms. Thinking that possibly malaria might be the cause of the trouble, large doses of quinine sulphate were suggested — to be followed later with Fowler's solution.

I heard nothing definite from the patient until December 28, when he came to my office for further examination and advice. He informed me that his pain began to subside after his first capsule and stated that during the first twenty-five days following my visit to him, while he was taking the capsules (quinine) he gained twenty-five pounds. Since that time, every once in a while he would have pains similar to, but not so severe as, those he had in July and August, but two or three capsules would relieve him.

When he came in December he had not taken any capsules for three weeks and had been having some pain. Still believing that his trouble was malaria, I had a blood examination made and plasmodium malariæ were found, proving the correctness of my first suspicion. He was put on quinine bisulphate and Fowler's solution. After this he again improved until January 21, 1912, when he had another severe attack of pain, requiring a hypodermic of morphine. Since that time he has had no severe attacks, but still feels an occasional disturbance.

His blood was examined two weeks ago, when plasmodium malariæ were found, but not so numerous as formerly. At the time of my visit to him there was nothing in the history of this case or in the clinical symptoms to warrant a diagnosis of malaria, as no evidences of malaria had been found in the blood.

Having had a few cases of malarial hematuria it occurred to me that possibly the symptoms in this case might be caused by malaria. I felt that we were justified in at least applying the therapeutic test — quinine — which was satisfactory and which was later verified by the blood findings.

I report this case, as it emphasizes the importance of thorough, careful and exhaustive study of cases before subjecting patients to surgical treatment. Had this patient, with symptoms indicating renal or ureteral calculus more than anything else, been in the hands of less careful surgeons than Drs. Barkley and Wheeler, he might have gone through with a futile surgical operation.

PERINEPHRITIS.

HENRY JACOBSON,
ST. LOUIS MO.

Inflammation of the perinephritic tissue may result from the rupture of a kidney, with the escape of urine into the surrounding perinephritic tissue. This urine forms a good culture medium for the growth of bacteria, which may come from an infected bladder, kidney pelvis, empyema or the neighboring colon into this tissue through the lymphatics or blood vessels. The inflammation generally terminates in an abscess. It may be secondary to inflammation of the stomach, colon, liver, gall-bladder, necrosis of a rib or the vertebral column, calculous, tubercular or other inflammation of the kidney. The different bacteria of erysipelas, typhoid fever, small-pox, diphtheria, puerperal infection and abscesses in other parts of the body, circulating in the blood vessels and lymphatics of the kidneys, pass through the connecting lymphatics or blood vessels of the less resisting perinephritic tissue and cause inflammation. These bacteria usually need the additional insult of an injury to these parts to cause perinephritis. The inflammation may terminate with the formation of pus, or in milder forms there is an exudation of fibroplastic material. The exudation contracting about the kidney causes severe renal colic.

The following are examples of perinephritis from injuries:—

I was called by Dr. J. to see a mechanic, March, 1911. One month before I saw him he had fallen

about six feet, striking his right loin and back against the edge of a wheel. Following the injury he had nausea and vomited. This was accompanied by rise of temperature and chills. He complained of severe pain in the region of the right kidney and liver; at the time of examination I also found rigidity of the overlying muscles. There was marked tenderness, increased by pressure. He stated that the pains radiated to his back and down the right thigh. Inspection showed some fullness of the right loin, also dullness on percussion. His tongue was dry and furred. The urine was dark red, no albumen or pus. He consented to an operation the following day. At the operation I found a very large abscess surrounding the kidney, and although the kidney could easily be palpated, there was no communication with it. We introduced a large size split rubber drainage tube, filled with gauze, to the bottom of the abscess cavity. He made an uneventful recovery.

September 10, 1911, I was called in consultation to see a man who stated he had been kicked in the left loin and back by another man about two weeks previous, since which time he had suffered severe pains in the region of the left kidney and back. At the time of examination we found his temperature 101.5 Fahrenheit, pulse 96, hands and tongue tremulous, the latter dry and furred. He presented every indication of having drank to excess. There was bulging over the left kidney, dullness on percussion, excessive tenderness and pain on palpation. We operated upon him the next day and found an extensive perinephritic abscess. The after-treatment was the same as in the first case. His recovery was slower, because the alcoholic intoxication prevented rapid reparative progress.

Careful and extensive studies of Gerota, Tuffier, Lajars, Stahr, Morris, Rovsing, Kuster and others,

have greatly assisted us in our understanding of the different modes of infection of this tissue, and the channels traversed by the offending bacteria. In the same way these pioneers have assisted us to foresee the complications and prognosis of this disease. Let us review the anatomy of the perinephritic tissue.

The fatty tissue of the kidney is surrounded by the fascia renalis of Gerota. This separates it from the retroperitoneal tissue except at the lower pole of the kidney, when it communicates with the retroperitoneal tissue. A rich network of lymphatics penetrates this tissue and connects with the numerous lymphatics of the kidney and these empty into the lumbar glands. The veins of the perinephritic tissue empty into the veins of the kidney at the hilum; also into the veins of the ureter and suprarenal veins. There is frequently anastomosis between these veins. Pathologists have frequently demonstrated that bacteria may pass through the blood vessels of the kidney and tubules and be found in the urine. These same bacteria may reach the perinephritic tissue through its connection with the kidney as above mentioned and set up inflammation, especially if this tissue has been injured and has thereby become less resistant.

The symptoms depend upon the degree of inflammation. In the mildest form there is only an outpouring of fibro-poastic material and perhaps an increase of the fatty tissue. In the more severe infection in which we have pus formation, it may happen that only the upper perinephritic tissue is involved in abscess formation. In another form there is a breaking down of the entire perinephritic tissue and the entire kidney is surrounded by a large abscess. This abscess may rupture into the peritoneal cavity, causing suppurative peritonitis and death. If it ruptures into the pleural cavity, there are symptoms of empyemia. There is dullness upon percussion, bulg-

ing and filling out of the intercostal spaces, shallow, quick respiration, chills and elevated temperature. The abscess may rupture into the bronchial tubes, with expectoration of foul pus. There is frequently œdema of the lower extremity, albumen in the urine from pressure on the kidney, furred tongue, fever, chills, pain in region of the kidney, increased by pressure or movement, and rigidity of the muscles. If the abscess makes its way towards the surface in the loin, groin or thigh, the skin is œdematous and red before it ruptures or is opened by the surgeon. If it ruptures into the bowel we find pus in the stools.

We have to differentiate this condition from new growths. Tumors are slow growing. There is no temperature, no chills, no rigidity of the overlying muscles. Blood may appear in the urine. Pain is a late symptom, occurring when pressure symptoms occur. Later there is dyspnea, cyanosis, œdema of the lower extremity. If it involves the right kidney, pressure on the bile duct will cause jaundice. If on the left side it may displace the heart and cause palpitation. Neuralgia occurs later and also curvature of the spine. In malignant growths growing rapidly, occasionally there is fever. If we suspect calculi of the kidney as the primary cause, have a radiograph taken.

Treatment. The earlier the abscess is opened the better. One ought also be sure there is free drainage afterwards. If due to stone in kidney remove the stone. If due to tuberculosis remove the kidney, if the other kidney functionates.

Rosenberg collected reports of twenty-six cases treated expectantly with perforation of the peritoneal cavity, lungs, intestines, pelvis of the kidney, bladder and vagina, with fifteen deaths.

Morris states thirty-three and one half per cent rupture into pleural cavity or lungs. Kuster reports

two hundred and fifty cases of perinephritis with fifty per cent rupturing into the plural cavity and lungs — thirty-four per cent rupturing into other organs and the peritoneal cavity. Perinephritis is a rare disease. Socin found four patients affected with it in sixteen thousand six hundred and sixty-one cases. Sutton reports one in four thousand four hundred and thirty-seven.

References.

System of Practical Surgery, Bergman.
Genito-Urinary Diseases, L. Casper.
Genito-Urinary Diseases, Watson and Cunningham.
Genito-Urinary Diseases, White and Martin.
Tumors of the Kidney, Garceau.
Handbuch des Urologie, Von Fritsch, etc.
Pathologische Anatomic, Kanburan, Ziegler, etc.
Urology, by Ramon-Guiteras.

DISCUSSION

OF PAPERS OF DRS. BARNEY, SMITH AND JACOBSON.

DR. CHARLES GREENE CUMSTON of Boston: The paper of Dr. Smith in relation to malaria and renal disease is of particular interest to me, as within the last few weeks I have had a case which shows how even with the greatest care one may be misled. The French particularly, and the Germans somewhat, have given us quite a few contributions on the differential diagnosis of renal affections and malaria, and in reference to hematuria particularly, but the case I would like to mention (as we all profit by our errors) has its little tale. I have done, as you are probably aware, some little work on pyelonephritis of pregnancy, and in this instance the patient had been confined exactly four weeks before I saw her. The family physician, who is a very competent man, told me that the labor had been perfectly normal. She progressed very well until the end of the fourth week. At that time she set up a temperature of 104 degrees, with a chill, and complained of a great deal of pain in the right renal region. The doctor followed her for about ten days. During the ten days she had three chills, and the temperature ranged from 104 degrees to 105 degrees. When I saw her palpation of the left kidney revealed nothing. Palpation of the right side showed an enlarged kidney; undoubtedly the lower pole could be palpated and it caused great pain. My provisional diagnosis was a right-sided pyelonephritis, post partem. Dr. Garceau catherterized the patient for me. I cannot give you the exact details of the urinalysis from the two kidneys because I have not my notes. However, I remember this, that the functions of the left kidney were perfectly good. Microscopically there was nothing. The right kidney urine presented pus. Upon that I cut down upon that kidney, which was found somewhat enlarged, rather flabby, what I would call a succulent kidney, rather pale when incised, and no pus or any evidence of abscess was found. The capsule peeled with ease, and I merely inserted a large drainage tube down into the renal pelvis. For the next three or four days the patient remained quite the same, and then shot up a temperature of 105 degrees with chill and sweating. Then it dropped and recurred again four days later. I should have said in the beginning that both the family physician and myself were quite careful in

going into the past history of the case. No evidence of malaria had been found. When she had her second chill after the operation her blood was examined and proved negative as far as malaria was concerned, but there was a very marked leucocytosis, I think about thirty-two thousand. I then came to the conclusion that I had overlooked a small abscess somewhere in the kidney, although I had incised it freely and found nothing. Things went on in this way and three or four days later she had another chill. Then I had a talk with her. I asked her if in her past history she had ever been seriously ill, and I finally elicited from her that at the age of eight years she had been treated for six months for malaria and had been given quinine in large doses. I immediately put her on fifteen grains of quinine at nine o'clock in the morning, as the chills came on at about eleven, and since then she has been making an uninterrupted recovery. It is clear that there was a mild pyelitis but the high temperature was due to an old malarial infection. The chart was very typical of a renal infection of severe type.

DR. M. LAUTERMAN of Montreal: I am very glad to have this opportunity of expressing my appreciation of Dr. Barney's paper. I was fortunate enough to have an experience that confirms quite fully what he says, and I may be permitted to quote a case that was referred to me by one of our well-known gynecologists in Montreal, that occurred in his experience. During the course of a hysterectomy he was obliged to tie one ureter. Six months later he was obliged to deal with a hydronephrosis on that same side in this patient who had no other ill effect.

A case that occurred in my own practice was also one that had been operated on by a very competent gynecologist. This gentleman included the ureter in his pedicle, and the patient suffered from suppression of urine. He asked me to see the case with him twenty-four hours after operation. I suspected what had occurred, catheterized, found the condition present, opened the abdomen again thirty hours after operation, relieved the condition, and the patient made an absolutely satisfactory recovery.

I may add that this paper is certainly one of the best worked out that it has ever been my pleasure to hear, and as I said before, my own appreciation is offered. This is really the class of work that makes for efficient data and efficient progress along our line of work. I am very happy indeed to be present to hear this excellent contribution.

DR. BARNEY: A point in Dr. Jacobson's paper brought to mind some work that I have done along this line, looking up some

fifty or sixty cases of perinephritis that occurred at the Massachusetts General Hospital, and doing some experimental work on animals. My impression has always been, and I think that it is shared by others, that the lung symptoms, that is, empyemia, often preceded the kidney symptoms. The impression was that the infection from the lung or from the pleural cavity descended by the lymphatics or otherwise to the kidney, whereas it occurs just the other way. In looking up these cases a careful examination showed that the kidney symptoms had preceded the lung symptoms, while in animals we find that by the injection of pigments, such as methylene blue, etc., into the perinephritic tissues the pigment is carried into the pleural cavity in a large number of cases. There are exceptions. On the other hand, the injection of pigments into the pleural cavity showed that only in very rare instances is it carried to the kidney. Therefore I think we can prove that these empyemas, etc., are the sequellæ and not the cause of the perinephritic infection.

DR. JACOBSON: I think the Society is indebted to Dr. Barney for his valuable experimentation on this line of work. In line with his experimentation, I just want to say that about ten years ago I had the pleasure of seeing a very interesting specimen. A little child was brought to the post mortem table. It had lived three weeks. At the post mortem they found a solid portion of the ureter, say two and a half inches long, and instead of a kidney, a dilated little bag like a balloon, just a thin membrane. The entire nephritic tissue had been destroyed. How long the pressure had taken place we did not know. But experimentation shows that we should not give up hope and remove a kidney right away. But I suppose back pressure after six or eight weeks begins to destroy the kidney. I should like to ask Dr. Barney if he doesn't think so.

[Dr. Barney: In animals the kidney will go on secreting urine longer than that (ten days).]

I referred to the fact that statements in the text-books were erroneous. If you will look up this matter in the majority of what we consider standard text-books you will find that they state that ligation of the ureter produces atrophy of the kidney. Now it may produce atrophy of the kidney, but by atrophy of the kidney I think any ordinary man would understand an actual decrease in the size of the kidney produced by lack of use; that is, atrophy in the ordinary sense of the term; whereas you really get a hydronephrotic atrophy, a distension of the renal sac and an atrophy in the renal tissue by pressure.

THE MANAGEMENT OF GONORRHŒAL RHEUMATISM.

EUGENE FULLER,
NEW YORK CITY.

Before making a special study of this subject, I felt — as I expect most of the profession now feel — that gonorrhœal rheumatism was a direct complication which could be associated with the later or declining stages of an acute infection; although the symptoms might be most acute, still they were often subacute. I also felt that after the urethral discharge ceased and the urine became clear or free from inflammatory evidences directly associated with the gonococcus, the complicating rheumatic symptoms always eventually disappeared, although the period of convalescence might be very tedious; and should I have seen a patient suffering from rheumatism which he had had for years in a constantly progressive or relapsing form, I should not have thought of connecting such a chronic condition with a gonorrhœa of perhaps so many years before that the youthful indiscretion had been largely forgotten. On the therapeutic side, about all I did know was that gonorrhœa was not at all favorably affected by the salicylates, uric acid eliminants, or various drugs having beneficial effects when administered in connection with other forms of rheumatism. On this account, the disease was looked upon as a professional bugbear, and as one liable to damage rather than enhance a surgeon's reputation for skill.

With my further knowledge of the subject, I can but feel the time-honored term, gonorrhœal rheumatism, to be a very unfortunate one, for the following reasons: In the first place, just what rôle the gonococcus plays in the production of this complication has not been determined. There is a strong suspicion in my mind that its part is a secondary one, and perhaps not even that. Then, from a clinical standpoint, the term itself handicaps and embarrasses the surgeon, especially in dealing with the chronic forms of disease. Fancy, for instance, the results attendant on a diagnosis of gonorrhœal rheumatism in connection with a gentleman past middle age who has been happily married for years, and who occupies an established social, political, or religious position. In such cases I use the term "absorptive" or "toxic" rheumatism, explaining that the systemic sypmtoms depend on the absorption into the system of a toxic element which originates from a septic focus, the elimination of which will free the system of the poisonous element, thus ensuring a cure of the rheumatism.

The foregoing explanation has also the merit of being a definition of the affection in relation not only to the chronic but also to the acute cases.

My active study of and interest in this subject covers a period of somewhat over seven years, dating from December, 1904. At that time, I found in my wards at the City Hospital a young man with a very marked acute suppurative gonorrhœal seminal vesiculitis. Complicating this condition, there also existed a most acute and extensive gonorrhœal rheumatism. The man had been bedridden for four months with the rheumatism. A detailed report of this first case, together with three other similar ones, will be found in the June, 1905, issue of the Annals of Surgery, the communication being entitled: "The Rela-

tion of Gonorrhœal Rheumatism to Seminal Vesiculotomy." As I had already at that time opened and drained the seminal vesicles on numerous occasions with marked benefit, and as the pathological condition of the seminal vesicles in this case demanded drainage, I felt that it would be a matter of interest to watch and observe what effect, if any, this operation would have in relation to the rheumatic complication. I was greatly surprised in this case to find that all pain had vanished from the joints twenty-four hours after operation, while at the end of five days all of the extensive swelling had disappeared from the joints and limbs.

Later extensive experience in connection with acute gonorrhœal rheumatism uniformly showed exactly similar results, the rheumatism disappearing in the same rapid and complete manner observed in the first instance, after performance of seminal vesiculotomy. Coincident with my first above-mentioned report, Dr. John Rogers announced his experiments with anti-gonorrhœal serum, administered with the purpose of curing gonorrhœal rheumatism. The idea of curing the affection with a series of serum or vaccine injections was certainly far more attractive to the profession and to the patients than was my operative procedure. Any one could use serum, while for my operation one would require to be not only a surgeon but also one who had skilled himself in the special technique required. I was accordingly left to quietly pursue my operative investigations while the eyes and attention of the profession were directed toward serums. Although wishing to give sera a perfectly fair trial, I could not — even at that time — feel that they would at best prove more than sporadically efficient. It was evident to me that a patient afflicted with gonorrhœal rheumatism harbored a patholoigcal focus from which, constantly

or intermittently, a systemic toxæmia occurred, a result of which was the existing rheumatism. If the sera accomplished what their advocates claimed, and neutralized or removed existing systemic toxæmia, I did not see how they could be radically efficacious unless they could also and at the same time cure the pathological focus, thus preventing, as does my operation, future systemic toxæmia. If a pathological focus, as not infrequently happens, ends in resolution, either spontaneously or as the result of palliative forms of treatment, then, of course, there would be a corresponding termination of the resulting rheumatism.

It is not unlikely that serum or vaccine treatment with the latter class of cases would be of benefit in hastening the disappearance of rheumatic attacks. I understand from a mutual professional friend who has discussed this subject with him, that Sir A. E. Wright of London is in accord with my views, and that he ascribes the indifferent results from serum or vaccine treatment in these cases to the fact that there exists a systemic focus of infection which by its repeated reinfections more than counteracts the injections administered. If the time ever comes when mastoiditis, for instance, no longer demands operative surgery, the disease being under the complete control of vaccines or sera, then, I take it, gonorrhœal rheumatism will likewise be found amenable to the same forms of treatment. Until then, seminal vesiculotomy will hold its place as the radical method of cure.

My early operative experience, as already stated, was in connection with the acute cases of gonorrhœal rheumatism, wherein the causative seminal vesiculitis was also acute and well marked, the organs being swollen, infiltrated, and surrounded oftentimes by periseminal vesicular œdema, while an active sup-

purative process was in existence in the sac cavities. With further experience, cases of more chronicity came under observation, there being, perhaps, a stiff ankle, knee, wrist, or other joint or joints. These joints, as a rule, were involved in a hard inflammatory exudation. Such joints oftentimes presented an appearance closely resembling tubercular conditions. On clinical investigation it would be found that a gonorrhœal or urethral discharge had occurred, perhaps a year or so before. Such a discharge might have soon ceased, or might still be persisting as a slight gleet. Perhaps there would be a history of an acute attack of rheumatism two or three months after the onset of the discharge, the present condition persisting, or perhaps there had been no such antecedent attacks, the existing involvements having come on insidiously and slowly progressively, commencing, perhaps, six months or a year from the time of the urethral attack, and not, very likely, until long after the patient had supposed his urethral inflammation cured. In this latter class of cases, the seminal vesiculitis accounting for the rheumatism would not be nearly as acute as found in the preceding class.

Another peculiar point — and one which at first caused me to hesitate before operating on numerous occasions — lay in the fact that the extent and grade of an existing seminal vesiculitis bore no fixed relation to the grade and extent of the resulting rheumatism. Thus, one might find a very severe and extensive seminal vesiculitis in a case where the rheumatic affection was not extensive or of a severe grade; while in another case, where the rheumatic symptoms were very extensive and crippling, the seminal vesiculitis might very likely seem mild in character, the lesion consisting chiefly of a sclerous thickening of the sac walls, there being but little peri-seminal vesicular involvement and but a minor degree of intra-

seminal vesicular catarrh. Then, again, there would be many cases wherein the grade and extent of the rheumatism seemed to correspond with that of the seminal vesiculitis.

Experience has shown me, however, that the removal of an existing seminal vesiculitis through seminal vesiculotomy regardless of its apparent grade or extent, will be followed by the disappearance of the rheumatic complications, whatever they may be.

Then, finally, there comes a third and most interesting class of cases, the extent of which I have not yet fathomed, although I am actively studying the subject. These consist of cases in which neither a preceding gonorrhœa nor a genito-urinary complication has been considered, or probably even thought of, as having any relation to the existing disability. Hitherto few of these cases have come to me as a genito-urinary surgeon, for the reason just referred to — that no one supposed they belonged to my department of medicine. For most of them, I am indebted to my service at the City Hospital, where the courtesy shown me by those visiting in other departments, combined with the active assistance of an interested house staff, has enabled me to have transferred to my divisions material originally admitted to orthopedic or general surgery, to general medicine, to neurology, and sometimes even to ophthalmology.

Thus, there might be chronically stiffened joints without any effusion, associated with contracted tendons and marked muscular atrophy. The spinal vertebræ and the associated muscles might be rigid and immovable, together with a fixation of the ribs, the classical picture of supposed arthritis deformans being presented. In such cases, oftentimes there was also a fixation of the cervical vertebræ, so that there was no rotation of the head. The jaws might be so fixed

and locked that nothing but fluid food could be taken. The muscular atrophy might be so marked in connection with rigid joints and tendons that a diagnosis of progressive muscular atrophy or some other form of spinal lesion had previously been made. The joints, instead of being stiff and without effusion, might represent an opposite condition — there being great effusion, and the joint capsule, especially the knee, having been thereby so stretched as to make it very loose and flail-like. Irido-choroiditis or some other insidious exudative process of the eye-ball might exist, of so severe a grade as to cause or threaten blindness. A much longer recital of clinical conditions could be given to represent the pictures often seen, illustrative of this affection in its multiple chronic phases. Still, the present recital ought to be sufficient to put the investigating surgeon on his guard.

In getting a clinical history in these cases, one would very likely get a report of a gonorrhœa perhaps twenty years before. In some instances there would be no history, or perhaps remembrance, of such a past condition. In one case which first came under my observation in its rheumatic incipiency almost twenty years ago, and which I have had under observation ever since, I am positive there never was a gonorrhœa, the seminal vesiculitis being caused apparently by the streptococcus.

That the above described group of very chronic conditions really belongs to the same class as the acute rheumatisms already considered, I have proved — first by discovering the co-existence of seminal vesiculitis, generally in a most sclerous form, and then by curing the disorder through the performance of seminal vesiculotomy, thereby eliminating the focus of infection which caused the systemic toxæmia. It is not to be expected that the same rapid and

striking cure follows operation in the old chronic and severe cases as in the acute ones. Secondary muscular atrophy and joint adhesions are, of course, left after the chronic toxæmia has been eliminated, and the surgeon has in the post-operative convalescent period of these cases practically the same problems to deal with which he has in convalescence from fractures of long standing, where there coexist like conditions of muscular atrophy and of joint and tendon adhesions. At a suitable period after resolution in connection with the fracture has taken place, massage and passive joint manipulation is prescribed. So, in these post-operative rheumatic cases, there comes a time when massage and passive joint manipulation is most essential. Formerly, however, I inaugurated such post-operative treatment much sooner than I now do. I find it a mistake to make use of these treatments before the last fraction of the toxæmia has been eliminated, otherwise an inflammatory reaction may ensue. Formerly, also, at the time of the operative anæsthesia, or within a few weeks after operation, I forcibly manipulated stiffened joints and limbs, vigorously, and with the use of considerable power breaking down joint and ligament adhesions, thus restoring normal movements. Now, however, I consider such vigorous treatment during the toxic period to be inadvisable. I find it best to leave joints and muscles alone for a period of two months after operation, allowing the patient to make such progressive use of them as he may see fit. In cases not of the severe grades, the progressive use of the parts made by the patient himself will very likely by the end of two months have been found to be all that was necessary. At the end of such time, however, manipulative treatment, if indicated, will do much in hastening the restoration of joint function. Such manipulations should not be too severe, especially at

the start, and should be administered by one who has had training or experience.

In my earlier operative experience, much more frequently than at present, I noticed a month or thereabouts after operation some temporary rheumatic recrudescence of symptoms, all such evidences having promptly disappeared after operation. I found such recrudescences to correspond to the closure externally of the wound. It was evident to me that the closure in these instances had been premature and before all toxæmia had been drained from the deeper parts. Consequently, I made it a point not to remove my external drainage tubes for ten days or until such time as the deeper wound had thoroughly drained and granulated. Such conditions having been attained before the external wound is allowed to close, there will be no such recrudescence. The operative technique and management of seminal vesiculotomy will not here be considered. For such information, reference is made to the author's article, "Relief of Urinary and Genital Conditions through Surgery of the Seminal Vesicles," in Medical Record, October 30, 1909.

I have often been asked regarding the bacteriological findings in connection with the work now being considered. It would be of much interest and probably of value in determining the exact bacterial or toxic agency concerned in the causation of this form of rheumatism could there be an examination of smears taken from the intra-seminal vesicular contents on the opening of the sacs. I have found this impossible of accomplishment except in a very few instances, for the reason that the seminal vesicles when opened are not exposed to view, the sense of touch being the guide, and as the path of the wound is deep and narrow, the smear carrier introduced, guided by the finger, comes in such contact with blood and serum on its introduction to and withdrawal from the sac

cavity, that subsequent smear findings can, at best, be far from accurate or satisfactory.

Owing to the positive claims of cures which are just now beginning to appear from the use of electricity applied to the prostate or seminal vesicles, it seems necessary to give some notice to the subject. As there is no evidence at all that electricity in any of the multiple forms in which it has been applied has been found curative in any variety of sepsis, or has power to destroy germ proliferation or to free the natural cavities of the body of inflammations or their resulting exudates, it does not seem worthy of belief that this agency on impartial investigation will be found of potent or general value in this connection. This is not the first time that electricity has proclaimed herself a cure for a surgical disorder. She has done so, and loudly, many times, only to be many times discredited. Twenty-five or so years ago her champions announced that stricture of the urethra in all its forms could be quickly absorbed and cured by electricity. Very many wonderful statistics of cures were published to support these claims. Investigations thoroughly discredited these as well as similar claims made some years later, of cures by the Fort method. Then, in the early stages of gynæcological surgery, in connection with ovarian tumors and extra-uterine pregnancy, the claim of electricity supported by the usual array of cures was again raised. Now, any one trying such treatment for such disorders would — to put it mildly — be considered most unethical. Again, in the early days of prostatectomy, the Bottini method was resurrected as a simple cure, free from danger and far preferable to prostatectomy. Here again, the claim has been found wanting and the method has been discarded. Seminal vesiculotomy is a new procedure, and while the profession are considering it, it seems only natural

that electricity should do as she has done so many times before, under similar conditions — namely, put in her claim of ability to beat the knife. Electricity, barring possibly the X-ray, in her attempts to displace surgery, has run a poor second to Christian Science. Electricity as an aid to surgery has done much in the direction of the X-ray, in illuminating spaces otherwise inaccessible to sight, and in allowing a cauterization of similar parts. I have, of course, profound respect for the accomplishments of electricity in the field of therapeutics.

In the article already referred to, which appeared in the Medical Record, October 30, 1909, I reported my first one hundred and twenty-six cases of seminal vesiculotomy. Of these, thirty-five represented cases of rheumatism. Since then, I have performed seminal vesiculotomy one hundred and twenty-five times, so that at present my total operative cases number two hundred and fifty-one. Of these last one hundred and twenty-five cases, eighty-seven represented rheumatism. With most of these, the rheumatism, acute or chronic, was of a very severe grade, and it was for the relief of the rheumatism only that seminal vesiculotomy was performed. A minority of the cases had other clinical symptoms due to seminal vesiculitis co-existing with rheumatism as a reason for operation. In this last series, a much larger proportion represented rheumatic conditions than pertained to the first series. This is largely because rheumatism is the clinical symptom of seminal vesiculitis which usually, by incapacitating an individual, brings him to hospital, and in my experience at the City Hospital when those suffering from rheumatism see the rapid cures resulting with little post-operative discomfort in those who have been subjected to seminal vesiculotomy, there is such a scramble for operation that no time has to be wasted in persuasion.

Out of two hundred and fifty-one cases there has been no mortality, so argument against the operation on that score cannot be very impressive. In my last series, the results with rheumatic cases have been uniformly good. I attribute the better results in the second series to a more thorough performance of the operation and to improved post-operative details. I expect shortly to prepare a paper in which more attention will be given to certain features, especially clinical ones, that I have not here had space to include.

EXPERIMENTAL INVESTIGATION OF THE VALUE OF HEXAMETHYLENAMIN (UROTROPIN) AND ALLIED COMPOUNDS.

CURTIS F. BURNAM,
BALTIMORE, MD.

This study was undertaken to determine the capacity of infected kidneys to excrete hexamethylenamin. We had just had a small series of unilateral kidney infections where large doses of urotropin had failed to be of any benefit. The frequent clinical failure of the drug, it was felt, might depend on its inability to pass through such impaired organs. At the outset, full credence was placed in the generally current valuation set on hexamethylenamin; *i.e.*, when taken by mouth, it is excreted in the urine, bile, pancreatic, synovial and cerebro-spinal fluids in sufficient quantities to be of marked bactericidal value. This confidence, however, was not strengthened by a rather thorough review of the extensive literature on urotropin, and personal expermental results which quickly developed gave still greater uncertainty. Ever since Nicolaier introduced it into medicine, nearly twenty years ago, the efficiency of the drug has been ascribed to its decomposition into formaldehyde. The authors, however, are quite vague, using such adjectives as a little, partial, and almost complete, in describing the extent of this decomposition, and not a few hold that urotropin is antiseptic itself independent of the formation of formaldehyde.

Nowhere has there been serious endeavor to ascertain how much urotropin or formalin are present in the fluids of the body after giving the drug by mouth. Its accredited efficiency in the body fluids where it has been described rests, first, upon a demonstration of the existence of either urotropin or formalin in the fluid; second, upon clinical improvement; and third, upon the reduction in the number of bacteria as shown by the plate culture methods after its use.

In my personal studies the seemingly necessary steps were, first, a quantitative demonstration of the amount of urotropin excreted in the urine after giving known quantities by mouth; second, a quantitative estimation of the amount of free formaldehyde present; third, determination of the bactericidal power of urotropin; fourth, determination of the bactericidal power of formalin; fifth, determination of the strongest solutions of urotropin and of formalin which can be tolerated by the kidneys and other urinary organs; sixth, a comparison of the chemical and clinical findings. The third, fourth and fifth steps proved simple and yielded positive results, the details of which follow. Great difficulty, however, was met at the very outset in connection with securing suitable chemical methods for estimating the amounts of the substances in the fluids. Not only were the quantitative methods uncertain, but the qualitative procedures were equally unsatisfactory, principally because they reacted identically with urotropin and formalin. The most delicate qualitative test in use and one which has been extensively employed, is that of Hehner. It consists in adding five or six drops of milk to a few c.c. of the fluid to be tested. This mixture is then stratified over a reagent made by adding one drop of a three per cent Ferric chloride solution to 100 c.c. of ninety-nine per cent sulphuric acid. The presence of formaldehyde or

urotropin is indicated by the slow formation at the line of juncture of a deep amethyst ring. The color of urine and bile seriously interfere with the test and require a preliminary distillation, which is accomplished by adding a little sulphuric acid and water, when formaldehyde gas passes off in the distillate. The objections to this test are twofold; first, that it does not differentiate between formalin and urotropin, and second, because of its extraordinary delicacy. Formaldehyde clearly shows in solutions of 1–1,000,000, and urotropin in solutions of 1–500,000 or less. This is inconceivably small. By the thickness of the ring or the rapidity of its appearance I was completely unable to distinguish between solutions of 1–100,000 and 1–10,000, nor could I determine from the ring formation whether formalin or urotropin was the substance present. Through the kind assistance of Dr. H. A. B. Dunning, I was fortunate in securing a very delicate test and one which reacts to free formaldehyde, but not to urotropin. This test consists in adding to the suspected fluid, three drops of five-tenths per cent aqueous solution of phenolhydrazine hydrochloride and then three drops of a five per cent aqueous solution of sodium nitroprusside, then an excess of saturated aqueous solution of sodium hydroxide. It is important that the solution to be tested as well as the sodium hydroxide be slightly warmed a little more than body temperature. When formaldehyde is present in solutions of 1–20,000 or stronger, there follows an intense blue color which gradually changes to green and then after a few minutes to brown. In solutions of less than 1–20,000 the first color is the intense green which passes off into brown. The test is delicate down to 1–150,000 or less. When a solution is tested and found to be negative, as is the case when urotropin is noted, it can be acidulated with sulphuric

acid, heated to boiling, cooled off, and tested, when the reaction will be positive, due to the breakdown of urotropin into formalin. This has yielded striking results in the urine, the bile, the sputum, the saliva, and the cerebro-spinal fluids, and so contradictory of the generally accepted views that it seemed important to bring them to the attention of the profession. I have thus been diverted from my original purpose, the quantitative estimation of the urotropin and formalin in the urine. I have at present a promising quantitative method for these determinations and will embody my results in a later communication.

I wish to present here the results of my experiments in regard to the bactericidal powers of urotropin and formalin, the toleration of the urinary organs to these substances, the question of the excretion of urotropin in the urine, the bile, the sputum, the saliva and the cerebro-spinal fluids. In addition to urotropin, I have employed helmitol and several other formalin compounds. Before taking up the actual findings it seems desirable to give a short historical review of the subject.

Hexamethylenamin is formed by the direct action of four molecules of ammonia on six of formaldehyde gas, according to the formula, $4\ NH_3 + 6\ HCO = (CH_2)_6\ N_4 + 6\ H_2O$. It occurs as colorless, odorless crystals, which are readily soluble in water, less so in alcohol. It was first prepared by Butlerow.[1] When acid is added to an aqueous solution there is partial decomposition into formalin and ammonia, and on boiling, complete decomposition. Boiling alone partly causes decomposition. The drug was introduced into medicine as a urinary antiseptic by Nicolaier,[2] and has ever since enjoyed wide popularity and extensive use all over the world. It remained as a urinary

[1] Liebig's Ann. d. Chem. u. Pharm., 1860, 115, 322.
[2] Deutsch. med. Wchnchr., 1895, No. 34.

antiseptic alone until S. J. Crowe,[1] gave it reputation as a gall bladder and pancreatic disinfectant, and one year later,[2] brought it into its present use as a prophylactic and curative agent in cerebro-spinal infections. Armstrong and Goodman,[3] following Crowe's method, introduced it into use as the disinfectant of the sputum in bronchitis, pneumonia, pulmonary tuberculosis and infections of the nose and throat. After giving it by the mouth, it has been found in the aqueous humor of the eye, in various synovial and pleural fluids. Many clinical contributions of a more or less confirmatory nature have been added and the use of the substance in these conditions has grown almost to equal its use as a urinary antiseptic.

In the rabbit, urotropin is practically non-toxic. I have given one hundred grains at a dose, hyperdermically, without the slightest evidence of poisoning. This animal weighed two pounds, so that the equivalent dose in the human being of one hundred and fifty pounds, would be about eighteen ounces. However, there is one marked difference between the human being and the rabbit, *i.e.*, in the rabbit, even on immense doses, there is no decomposition into formalin. The drug is excreted as urotropin. The toxic effects noted in the human being have been hematuria and vesical irritation, both due to a liberation of formaldehyde gas in the urine at the level of the kidney.

Antiseptic Value of Urotropin. Aqueous solutions of urotropin of varying strength were made and inoculated from cultures of the colon bacillus, the typhoid bacillus, the bacillus pyocyaneus, the streptococcus, the staphylococcus aureus, and the staphylococcus albus. In each case, enough of the organisms

[1] The Johns Hopkins Bulletin, Vol. XIX, 1908, p. 109.
[2] The Johns Hopkins Bulletin, Vol. XX, 1909, p. 102.
[3] Journ. A. M. A., May 27, 1911.

were added to give the solution a milky consistency. As a guarantee against free formalin formation a few drops of ammonia were added to each tube. These tubes were then incubated in periods of one to five days, every day a reinoculation was made on agar. Up to ten per cent the urotropin showed no antiseptic properties whatever. The typhoid and the streptococcus, which are poor growers on most media, were effected more than the other organisms, not any more, however, by urotropin than by ordinary sodium chloride solutions of the same strength.

Antiseptic Value of Formalin. Precisely similar technic was employed in studying the effects of solutions of formalin. It was found to be an antiseptic of exceptional strength, a fact which has, of course, been long recognized. A one per cent solution of formalin completely destroyed all the bacterial forms studied in twenty minutes. A 1–1000 solution destroys all of them within twenty-four hours. Marked differences in the toleration towards formalin was noted between the different bacteria. The most resistant organism was the staphylococcus aureus, and the least resistent, the typhoid bacillus. A solution of 1–5000 formalin destroyed the typhoid bacillus and the streptococcus within twenty-four hours. It destroyed the bacillus pyocyaneus within forty-eight hours, and the colon bacillus in four days. The staphylococcus aureus was still alive at the end of a week, but it was completely destroyed in forty-eight hours by a solution of 1–2000 formalin. Solutions of 1–20,000 formalin had little or no effect on any of the organisms except the typhoid bacillus and the streptococcus. These were not destroyed at the end of four days, but as shown by smears, were somewhat diminished in vitality. 1–50,000 formalin solution had apparently no effect either in destroying the organism or in inhibiting their growth.

Toxic Effects of Formalin. In solutions of one per cent and less, formalin is an irritant to the skin; in weaker solutions it is not irritant. Every year there are a few reports of serious poisonings resulting from accidental or suicidal drinking of formalin solutions. In a majority of the cases there are violent gastro-intestinal symptoms, and in the more serious ones, coma, which may last several days. In the fatal cases, death has resulted from gradual paralysis of the cardio-respiratory system. So far as is known to the author, there has never been a case in the human being of poisoning from urotropin due to liberation of formalin in the tissues. Jacobson[1] states that dogs can take daily 3.2 grams without serious results. On the other hand, one cm. per kilo is said to be toxic in a single dose. In association with Dr. H. A. Kelly, I have been using solutions of formalin, varying in strength from 1–1000 to 1–3000, in treating infections in various parts of the body, and have never noted any general toxic symptoms.

Tolerance of the Urinary Organs to Formalin. Our method of investigation here was, first, to try various strengths of formalin solution in the bladder, beginning with a very small percentage and gradually increasing it. Having found a solution which was well tolerated in the bladder, it was then injected into the kidney pelvis through a renal catheter. There is marked individual variation in the tolerance of the vesical mucous membrane to formalin solution, and this is independent of the state of inflammation present. Of course, an acutely inflamed bladder is much more intolerant than a healthy bladder. In chronic cystitis and in healthy bladders we have found it practical to use solutions varying in strength

[1] Berlin Klin. Woch. 1904, p. 114.

from 1–1500, to 1–3000. Occasionally a bladder is met with which does not tolerate even this weak solution. We have had no cases which would not tolerate a 1–5000 solution of formalin. The kidney pelvis will tolerate solutions as strong as does the bladder, and we have never noted any irritation in the kidney itself after an irrigation.

The formalin irrigations for bladder and kidney infections have proven very effectual. They are especially valuable in cystitis cases, associated with ammoniacal decomposition of the urine, such as occurs with an enlarged prostate or tumor of the bladder.

The gall bladder tolerates formalin readily in solutions of 1–1500. In infected incisions and sinuses, a one per cent solution can be used without giving undue pain.

A few tests were made with solutions of urotropin. It is not at all irritating and can be used in the bladder and kidney in fifty per cent strength without any ill result, but apparently with no effect on the infection.

Excretion of Urotropin in the Urine. When given by the mouth, urotropin begins to appear in the urine in fifteen minutes, reaches its maximum excretion in two hours, continues to be excreted abundantly for about eight hours, and has, if the dose given was not greater than thirty grains, disappeared in twenty-four hours. After the twelfth hour the amounts excreted are very small.

In a communication to follow this, I will report more in detail the quantitative eliminative amounts of urotropin.

The question of interest here is, how much formalin is present in the urine after giving urotropin by mouth. As yet, I have not sufficiently worked out this question, but can say roughly that in some patients it is possible to secure solutions of from

1–5000, and stronger. My important finding was here that on the customary doses, of from five to ten grains, given three times a day, not more than two patients out of ten showed any decomposition of the urotropin into formalin at all. This was tested out, not only on patients suffering with infections of the urinary tract, but on a series of normal individuals, and on a number of patients convalescent from operations.

When a patient was found to show abundant formalin after a ten grain dose, it also was found that a two or three grain dose often sufficed to show the breakdown. While not more than twenty per cent of those examined showed the formalin free after the smaller doses, at least sixty per cent showed it when the dosage was made from twenty to thirty grains, repeated four to six hours. In a few instances, where the formalin was not present after dosage of thirty grains, the quantity was raised to as high as one hundred grains at a single dose without causing a decomposition of the urotropin. There are some individuals who do not break down urotropin into formalin. It is of interest that when formalin is found in moderate amount after giving thirty grains of urotropin, with an abundance of urotropin at the end of three hours, at the end of twelve hours there is occasionally found almost as much formalin, although the urotropin excretion is then small. This, however, is the exception, not the rule.

At what point in the urinary tract is urotropin transformed into formalin? In every case where free formalin was found in the bladder urine and catheterization of the kidney carried out, the formalin was found at the level of the kidney. This fact was established in five successive patients. In one patient of this group the blood serum was examined and found to contain urotropin but no formalin. It is

my impression that the formalin liberation is due to a specific function of the renal epithelium. It is, of course, impossible to conceive of free formalin in a highly ammoniacal urine. The alkalinity, however, is normally not due to free ammonia. The greatest decompositions have been observed in highly acid urines. This, however, is not invariably the case, and it was frequently noted that in an acid urine there was no free formalin after giving the urotropin. The same thing holds for alkaline urines. With the reaction definitely alkaline, large amounts of formalin are occasionally met with.

Clinical Observations. The clinical results obtained have conformed in every way with the assumption that it is the free formalin which is the effective agent, and that it must be present in fairly strong solution. In not a single case has there been observed the slightest improvement from giving urotropin where the urine showed urotropin but no free formalin. To the contrary, every patient showing free formalin has shown prompt improvement, and a number of the very chronic and obstinate colon infections have entirely cleared up. To obtain this result the treatment in some cases had to be carried over several months. A pertinent example of this kind was afforded by the case of Mrs. E. C. S., age twenty-nine, first seen October 26, 1911. This patient had always been healthy, and had had three normal labors. In March, 1911, when five months pregnant, she was seized with an attack of renal colic in the left kidney region; two days later she had a similar one in the right side. She was allowed to continue the pregnancy and gave birth to a healthy child in July, 1911. From the very first attack, the patient began having pus and blood in the urine. This continued after the labor and was associated with irregular fever, marked deterioration of general health and

great reduction in hæmoglobin. In November, 1911, she had the kidneys catheterized, functional tests made, and collargol injection of the pelves taken.

The results of these examinations were to show that there was bilateral colon bacillus infection of the kidneys, greatly dilated pelves, the left having a capacity of 120 c.c. and the right of 320. The functions of the kidneys, however, were fairly well maintained, as shown by the phenolsulphonephthalein test. Ten grains of urotropin by mouth sufficed to give free formalin from both kidneys. At the time of the examination there was an enormous amount of pus on both sides. The patient was started on one hundred and twenty grains of urotropin per diem; this occasionally caused vesical distress, when the dose was reduced. By February 3, the urine had practically cleared of infection. On that date Dr. Kelly suspended and plicated the pelvis of the right kidney. On the 20th of the same month a similar operation was carried out on the left side. The urotropin was continued during her stay in the hospital. A recent examination shows a perfectly sterile urine, free from pus and blood.

The Dosage of Urotropin. The average dose advised for urotropin is seven and five tenths grains, repeated two or three times per diem. In an occasional case of irritable bladder, even this amount of urotropin causes a sufficient liberation of formalin to produce irritation; such, however, is the exception. If it does cause the irritation, free formalin will always be found, and the indication is to reduce the dose. From what has been said, it is evident that there is no fixed dose. This is to be obtained by testing the urine and observing the toleration of the patient. Where ten grains causes no free formalin liberation, the dose should be increased to twenty, and if there is still none, to thirty or forty grains,

repeated every four hours. The only toxic effect due to urotropin is occasioned by the liberation of formalin, and when this does not occur, it is safe to push the dose until it does appear. The first disagreeable symptom in our experience is the vesical irritability. It has always led us to discontinue or diminish the dose. In such a case, pushing the dose might easily lead to hematuria. We have never observed a real hematuria from the use of urotropin.

The proper treatment is to give a dose just large enough to be under that necessary to cause bladder irritation. Using this dose, improvement will follow so rapidly in most cases that long continuation is unnecessary. On the other hand, it is certainly possible to keep up the dosage for months without any serious impairment of either the general health or of the kidneys.

Some of the Proprietary Hexamethylenamin Compounds. The first trade name and one which has been so universely used as to have become fixed is urotropin, which term has been repeatedly used in the text in place of the longer, pharmacological term. It is, however, sold under various other names, such as formin, cystogen, cystamin, hexamin, and so forth. These products are identical with hexamethylenamin and show no variation in reaction from it.

Helmitol, the methylene citrate of hexamethylenamin, also responds like the pure drug. There is this difference, however: when hexamethylenamin is dissolved in water no free formalin is formed; when helmitol is dissolved in water a considerable amount of free formalin is liberated. Formalin, however, when taken by the mouth, is not excreted through the kidneys. When helmitol is taken, its excretion is identical with that of urotropin. In some cases there is free formalin liberated, and in others, none.

Combination of Drugs with Urotropin. In the hope that the presence of some other substance in the

urine would cause decomposition of the urotropin, a great variety of substances have been given with it. Among these are potassium citrate, potassium iodide, benzoate of soda, salol, oil of wintergreen, and so forth. The results have not been encouraging; in no instance has the combination been more effectual than the pure drug.

Other Formalin-Containing Drugs. Dr. H. A. B. Dunning has furnished me with a number of formalin compounds, some of them new ones; some of them have been excreted through the kidneys as a compound between formalin and phenolsulphonephthalein. None, however, have shown a tendency to break down into compounds liberating free formalin. This matter is still under investigation.

Experimental Studies with Rabbits. The use of urotropin on rabbits was carried out in order to determine its toxicity and its method of excretion. Only three animals were employed. The results obtained were identical. In the rabbit, urotropin is excreted primarily and principally through the kidneys. It is excreted as urotropin, and is not broken down into formalin at all. In small doses, of from two to five grains, hyperdermically, in a two-pound rabbit, the excretion is practically entirely through the kidneys. When from thirty to one hundred grains are given at a dose, the principal excretion is through the kidneys, but there is a large excretion through the bile. This is also as urotropin and not as the breakdown product. The urotropin does not seem in the least toxic to the rabbit. When a rabbit is given thirty grains of urotropin hyperdermically and then killed within an hour, the findings in the different tissues were as follows: Urine, large amount; bile, considerable amount; cerebro-spinal system, traces; blood, considerable; spleen, liver and kidneys, considerable; muscles, trace; skin, trace. In no case was any free formalin

found. The findings in the rabbit induced me to investigate some other fluids of the body in human beings.

Examinations of the Bile. I examined in all ten patients with biliary fistula. None of them were getting less than sixty grains a day, and in one case I gave one hundred grains at a dose and collected for twelve hours. The bile in every case was treated identically; *i.e.*, it was diluted slightly with distilled water, acidulated with sulphuric acid, and distilled. In every case the distillate gave a clear formalin reaction with Hehner's test. In not one could a trace be found by the test which I have employed.

As a control, I put a solution of 1–50,000 urotropin into bile, allowed it to stand an hour and then distilled. The presence of formalin was easily determined and there seemed to be an actual concentration in the distillate.

Examinations of the Sputum and Saliva. In five healthy people I gave urotropin in thirty-grain doses, at the rate of one hundred and twenty grains a day for twenty-four hours, and then examined the saliva. By the Hehner's test, either urotropin or formalin was found to be present. By the phenolhydrazine-sodium-nitroprusside test, neither could be detected. In three cases of bronchitis with muco-purulent expectoration, exactly similar technic was followed, with identical results. By my test there was no free formalin, and heating and acidulating proved that there was no free urotropin in amount sufficient to give the reaction.

Examination of the Cerebro-Spinal Fluid. The cerebro-spinal fluid was examined in one case through the courtesy of Dr. Morse, of the Johns Hopkins Hospital staff. The patient, James B. D., age forty-five, had normal temperature and no cerebral or spinal symptoms. For purposes of diagnosis,

some of his cerebro-spinal fluid was desired. Before the puncture, he had been given for twenty-four hours fifteen grains of urotropin every three hours. I obtained about four c.c. of clear fluid, which showed a positive reaction with Hehner's test, but none whatever with the other test, even when boiled and acidulated.

Conclusions. These examinations of the bile, sputum, saliva and cerebro-spinal fluid show that even after rather large doses of urotropin, there appears in them but traces of the drug, certainly in percentages less than 1–100,000. Whether this trace is of urotropin, as seems most likely, or formalin, it is impossible to state, because the only test which would show it is Hehner's, which does not differentiate these two substances. So far as any therapeutic value is concerned, it would not seem to make any difference, because, as already shown, solutions of formalin of the weakness indicated, do not possess any antiseptic value. I believe, therefore, that the use of urotropin for the curing or bettering, or as a prophylactic against infections of the bile passages, respiratory passages and cerebro-spinal system, is illusory and cannot possibly yield results. I have no explanation to offer for the apparent clinical and bacteriologic improvements, as with the exception of the urine I have not tested the question. In the urine the clinical and bacteriologic tests conform in every way with the chemical finding.

The phenolhydrazine-nitroprusside test is a very simple one and when applied will give the physician an easy method of determining upon the dose of urotropin which he should use, and also shows those cases in which no hope can be held from this drug. The test is of value in determining the efficiency of any compound whose value rests upon the liberation of free formalin, and it is to be hoped that an endeavor

will be made to secure some compound which will liberate formalin in the urine in every case.

Although it has its limitation, these experiences show that urotropin, when properly given, in more than half the cases of urinary infection is of immense value, and at the present time superior to any antiseptic which we have.

DISCUSSION

OF PAPERS OF DRS. FULLER AND BURNAM.

DR. GEORGE K. SWINBURNE of New York: I want to say something on Dr. Fuller's paper, because certainly it has given me great food for thought. Some of his cases were undoubtedly amazingly successful, and we have had amazing success in gonorrhœal rheumatism by other methods. I should like to know whether he has had complete success in all his cases. This is a very severe operation to subject patients to unless you are very sure of the results that you are to get. And I think that most of us would wish to try every other means that were non-surgical before proceeding to this operation. I know that I have seen a number of cases where the source of infection did not lie in the vesicles, possibly in the prostate, certainly in the urethra. I recall one case that was very striking because of the manner in which the patient recovered. I have published the case before, but I never can forget the manner in which that patient recovered. Both knee joints, both feet and the right shoulder were in a lamentable condition, beginning three weeks after a gonorrhœa, he having had a previous gonorrhœa fifteen years before. He was on serum for six weeks. It was when I first began to use the anti-gonococcic serum. The patient lost during that time fifty pounds in weight, and could just drag himself to the dispensary. I then investigated his urethral canal for the first time, because he had a profuse, purulent, gonococcus-bearing discharge. I could only get a No. 16 bougie through the anterior urethra at three inches. He had a very cloudy urine. Dilating this stricture, which I did in the space of ten days, his pain left him, the swelling went down, and in the next six weeks he gained fifty pounds in weight, and

the only thing left was adhesions about the right shoulder joint, and then going back to the serum for a few injections the shoulder returned completely to its original function. So that here was a case where the stricture of the urethra was apparently the source of infection which affected his joints.

I have been using in the past year in a number of cases the metal electrode, also glass, using the static Morton wave current over the prostate and vesicles, combined with the bacterins and serum, and have seen good results in a number of cases (not in all cases), and I believe that there will be cases where perhaps this severe operation will be of benefit, but I will say that I have seen cases come to my clinic who had had the operation of vesiculotomy and who still carried many of their troubles with them.

I was very much interested in this last paper on urotropin. I wish that Dr. Burnam would tell us again what the reagent is by which he tests the urine.

DR. M. LAUTERMAN of Montreal: I am very much interested in Dr. Fuller's contribution, and I was impressed yesterday. I do not perform his operation myself. I do not think I ever saw it performed before yesterday. It struck me as being a rather serious operation to undertake until one had quite exhausted every other method, and I inferred from Dr. Fuller's paper that it was in that class of cases that it was indicated. I may not have understood him correctly, but I would like to ask if all the different forms of local treatment of the seminal vesicles, including massage, had been tried in these cases before having resorted to this operation. Of course, a great deal of epoch-making work is being done now in connection with the vaccines and sera in these cases, and I would like to ask Dr. Fuller to what extent, if any, he has taken cognizance of this work in connection with his cases. As I said before, I have never performed his operation. In the first place, I would not feel qualified to do so without knowing it more thoroughly than I do, and I should hesitate in the light of my present appreciation of the operation to recommend what I feel is such a severe procedure until I had tried every other means at my command.

I wish also to express my appreciation of Dr. Burnam's paper. I am impressed that this is the class of work that makes for progress in our profession. Dr. Burnam has evidently devoted a great deal of time and energy to the study of this urotropin question, which is to us one of very considerable, importance. Personally I had not been able to understand why

it was that one patient would show evidence of marked improvement while taking urotropin, while another was apparently uninfluenced. I think that Dr. Burnam's paper has cleared this up for us. I shall look forward with a great deal of anticipation to the publication of this paper in our transactions, which I am sure a great many of the gentlemen here this afternoon will study with interest and profit.

DR. VICTOR C. PEDERSEN of New York: With regard to Dr. Burnam's contribution, I would like to ask the Doctor whether he has also studied the combined effect of benzoate of soda and urotropin, as during the past three or four years I have been doing that, at the suggestion of Dr. William H. Thompson, who before the New York Society read a paper upon their value in infections of the genito-urinary tract, particularly those due to the bacillus coli. I have found that where urotropin alone does not do very much good, if the benzoate of soda is added in equal quantity good results begin to appear. Whether that is due to the combined effect or to the sodium benzoate alone, I am not prepared to say. I have also found that if we ascend in the dosage of the urotropin, much as we ascend in the dosage of potassium iodide in dealing with syphilis, we frequently get very beneficial results which previously were absent.

I recall particularly one case of infected bladder in a man with prostatic enlargement who persistently refused operation. The man did not begin to show any benefit from the medication until after I had passed thirty grains three times a day, and when I had reached fifty grains three times a day his urine began to clear, and at a drachm three times a day his urine became entirely clear and remained so for a long time, until in a moment of false security he neglected himself and became undoubtedly reinfected from autogenous sources. He is still under my care. He has a reasonably good bladder. He still will not submit to operation. I believe that by studying these cases and by ascending the dosage in that way, we may frequently get results when otherwise we might fail. Sometimes urotropin will cause hemorrhage from the kidneys, and when I begin to ascend in dosage I analyze the urine every week and thus defend the patient from any sudden irritation of the kidney. Dr. Lewis A. Stimson of this city told me that he had a case where the hemorrhage had reached alarming proportions and could not be controlled until after the drug was entirely withdrawn.

DR. O. S. FOWLER of Denver: I should like to ask Dr. Burnam if he has tested out this drug in the spinal fluid. It is recommended in cases of meningeal infection.

DR. BURNAM: I have not tested it out in the spinal fluid in human beings, but I did in a few rabbits, and it was present only in small amounts.

I have not tried benzoate of soda. I have tried a lot of other things, and Dr. Dunning in Baltimore has made me a number of new formalin compounds. One was a combination between formalin and phenolsulphonephthalein which goes through the kidney very promptly, but does not break down. It gives a beautiful color, even prettier than the phenolsulphonephthalein, but I have not tested the matter so far as the cerebro-spinal fluid is concerned.

DR. FULLER: About my operation. Dr. Swinburne has called it a very grave operation. What is a grave operation? An operation that you have done two hundred and fifty-one times without mortality, — is that grave? It makes a large cut on the surface, but I hold it is not a grave operation if it has no mortality. I wish the doctor would come and see the operation, for if he was acquainted with it his opinion would undergo a change. Everybody who does a large number of operations will have some who have complaints. I cannot cure everything in the world, but I have not killed anybody, and ninety-five per cent of my cases have expressed themselves satisfied.

As to the serum, most all of these cases that come into the City Hospital ward have been treated by serum at Bellevue, Presbyterian, or some other place, and have been transferred unrelieved into the City Hospital as a last resort. I have then tried my grave operation and have straightened them out.

It is a technical operation, but I think those gentlemen who saw the operation yesterday would not look on it as a grave procedure. If they are doubtful about it I wish they would come down and look at these cases I operated on yesterday at the post-graduate.

A SHORT ACCOUNT OF THE EARLY HISTORY OF SUPRAPUBIC CYSTOTOMY.

CHARLES GREENE CUMSTON,
BOSTON, MASS.

Many writers are of the opinion that the first operation of suprapubic cystotomy was performed on the archer of Bagnolet in January, 1474. The following is the description *in extenso*, as given by Naudé.

"The great desire and affection that he had [Louis XI] for the progress and advancement of science was such that, as Celsus has said, *Incidere virorum corpora et crudele supervacaneum esse*, and even although many laws prohibited physicians and surgeons from opening and dissecting bodies executed by law, he, nevertheless, permitted them to open the living body of a Franc-archer condemned to death, in order to recognize the causes and the formation of stone, as has curiously remarked Monsieur Riolan, the most learned and celebrated physician and anatomist who now exists in Europe, following the report which has been made by the author of the '*Rosier des guerres*,' in these terms, copied and transcribed word for word from the '*Chronique scandaleuse*': At this time, in the month of January, 1474, a Franc-archer of Meudon, near Paris, was a prisoner in the prisons of the Chastelet, on account of several larcenies which he had committed in various places, and even in the church of the said Meudon. And for these causes, as well as for sacrilege, he was condemned to be hung

and strangled on the gallows in Paris. His name was Montfaulcon, and he appealed to the Court of Parliament, where he was brought to argue his appeal; by this court and by its judgment the said Franc-archer was declared to have malappealed and had been well judged by the Prevost of Paris, to whom he was returned in order to undergo his sentence. Upon this same day the King was shown by the physicians and surgeons of the said city that several and various persons were extremely ill and molested from the stone, colic passion and pain in the side, the Franc-archer having been similarly molested, and Monsieur du Boccaige was at this time very much afflicted by this disease so that it would be very advisable to observe the location in which the said disease was seated within the human body, which fact could not be better known than by incising the body of a living man, which could be very well performed on the person of this Franc-archer, who was on the verge of undergoing the penalty of death, which opening and incision was done on the body of the said Franc-archer and the above-mentioned localities within the body were examined. And after they had been seen he was sewed up and his entrails placed back within him. And by the order of the King he was very well cared for and his wound dressed, so much so that within fifteen days he was perfectly cured and his sentence was commuted, and with this he was given money."

From what is here said it would appear that an extraordinary operation had been performed, one which had never been heard of and by which the possibility of its undertaking was to be demonstrated. However, the perineal incision was at this epoch a frequent operation, the surgeons exclusively employing Celsus' technic. This consisted in introducing the left index and middle finger into the

rectum, the right hand being pressed over the lower abdomen in order to hold the calculus. The left fingers pushed it forward until it reached the neck of the bladder, and when it had reached this point the skin was incised by a crescent-shaped incision near the anus down to the neck of the bladder, the horns of the crescent being slightly directed towards the thighs. Then at the deepest point of the crescent-shaped incision a second transversal one was made in order to open the neck of the bladder, the opening into this viscus being made a little larger than the diameter of the calculus. If the latter was small it was pushed forward by the fingers in the rectum and withdrawn by the right hand; if it was large, however, a hook was passed over its upper pole and it was then removed.

In the works of Guy de Chauliac, Brunus, Lanfranc, William of Salicet and Theodoric are many passages which indicate that this method was the only one employed by them. On the other hand, the surgeon who operated so brilliantly on the archer of Bagnolet is unknown, because Devaux is the only authority who says that it was Germain Colot who "begged the King Louis XI to accord freedom to the condemned man if he would allow the operation to be performed on him. The King accorded this permission and the archer went through the operation admirably." Now François Colot, in his work on calculus, does not mention this famous exploit as having been accomplished by his ancestor, and, consequently, it is very probable that in the case of the archer of Meudon the kidney, and not the bladder, was the seat of the disease.

The first suprapubic cystotomy, the account of which is absolutely authentic, was performed in 1556 by Franco, a surgeon of Lausanne, who, in his *Traité des Hernies*, relates the following case: —

"It once happened to me that I desired to remove a stone from a child of about ten years of age, but all

my efforts in order to bring it down were vain. Seeing this, and as the patient was extremely insistent, and the parents still more so, desiring that the child should die rather than live in such agony, I did not wish to be reproached for not having removed it, so much so that foolish as I was I decided to open the bladder on the penil a little to the side. This I accomplished by cutting on the stone, by raising it up with my fingers introduced into the rectum, having it held in place by the hands of an assistant who compressed the little belly, and by this means I withdrew it. The said stone was the size of an egg. And, nevertheless, the wound closed and was cured. However, I do not advise resorting to this means, rather employing the method that we have invented and which we have spoken of previously."

It is therefore clear that Franco performed this operation in despair, in order that he should not be reproached for having slightly drawn on the stone; but he did not make a perineal incision in the first place, as certain writers believe, because he simply says that it was impossible for him to bring the stone down; that is to say, to bring it into the neck of the bladder according to the method of Celsus. And lastly, his conclusion is particularly interesting, for he cautions against this technic in a most absolute way and only advises it as a supreme resource. He praises the technic which he invented, that is to say, perineal section in two stages; viz., incision on a sound introduced into the urethra, and then several days later, when the patient is found in good condition and without fever, the stone is withdrawn.

I have somewhat lengthily insisted upon this point because many historians have tried to show that Franco recommended suprapubic cystotomy, when in reality his preference is entirely for the perineal section in two stages. His conclusions have, in the

history of perineal section, a very great importance, and I will point out that many writers base their teachings on his authority to reject suprapubic cystotomy. Consequently, the sixteenth and seventeenth centuries passed by without any surgeon daring to renew his essay.

However, the discussion of the question was not closed, for it was very well studied from the theoretical standpoint as well as by numerous experiments, and many writers concluded that suprapubic cystotomy was a very easy undertaking and favorable from the standpoint of the patient. It was Rousset who was the first to propose suprapubic cystotomy as far superior and more practical than the perineal route, and for this reason I shall consider his work in detail and endeavor to point out with what remarkable precision and scientific acumen he created the very simple technic of his operation. Rousset first published in French his *Traité nouveau de l'hysterotomotokie* in 1581 and then, nine years later, in 1590, this work still more complete was published in Latin, several pages of which were translated by those lithotomists who performed Franco's operation.

Rousset was one of the most ardent partisans of the Cæsarean operation, and perceiving that the latter was easy to perform, he was of the opinion that the bladder could be reached by the abdominal route without danger. From his comparison between an incised uterus and section of the bladder in cases of calculus he in the first place refers to the objectionable points of the perineal incision: "In the ordinary incision of the bladder by the perineum one only proceeds by groping either in the cutting or in finding the calculus, one or several, and still more when withdrawing them; in such a way that often the most dexterous operators know well themselves that they have often been constrained to leave their

work imperfectly performed or to grab, tear away and bring along with their instruments a good portion of the bladder with the calculus. . . . . Why, then, should one submit to this danger of incision without need? . . ."

In another part our author says that there are several large veins, arteries, muscles, nerves and sphincters in the perineum, that one is in the neighborhood of the spermatic vessels, tendons and ligaments which it is dangerous to injure while searching, incising, dilating or rather cruelly lacerating the parts and the bladder by instruments introduced through the perineal incision. He then points out that all these dangers are avoided by the suprapubic method, which for all these reasons is a less dangerous route to follow. He then goes on to point out that a number of accidents occur in the perineal operation, which makes it still more to be feared, among others incurable perineal fistula. Further on he makes the statement that he has given much time and study to the new operation that he advises. And from another passage it is manifest that Rousset certainly had the intention of creating a new method not founded on the fortunate case related by Franco, but based upon his knowledge of abdominal incision and the theoretical advantages of this route.

Further on, in speaking of the operation undergone by the archer of Meudon, he proscribes, in spite of its successful outcome, this hazardous operation. According to his way of thinking it was a happy exception, but one which should remain isolated because, "as a single swallow does not assure a spring nor a beautiful summer's day, a single experiment is not sufficient to solve such difficulties."

After having given the reasons which caused him to prefer suprapubic cystotomy, Rousset describes the technic in his second work, which appeared in

Latin. We will give *in extenso* a translation of the essential portions of this work.

"We must now speak of the parts to be cut and the necessary instruments; the site of incision is double: extern and intern. The first incises the skin and the underlying fat occupying the pubic region. The other is hidden in the midst of the same region between the two recti muscles in their deeper part, or rather, between the two short muscles which are their auxiliaries, and under which is hidden the membrane coming from the pubis and extending to the fundus of the bladder to which it is adherent.

"Over the muscles is the fat and above is the skin, which should be incised with a knife to the extent of about three to four fingers' breadth, afterwards the fat, which is without sensation, and lastly the intermediary region between the pyramidal muscles, all this with prudence.

"The last spot (which is internal) should be incised with great dexterity with the point of a curved knife directed near the pubic bone, the knife directed not perpendicularly to the abdominal wall, but a little lower, rather directed towards the upper part of the neck of the bladder which is further on, but nevertheless leaving it quite as intact as the neighboring bone; this is an extremely small opening (so that the fluid in the bladder shall not escape), but sufficiently large so that a lenticular, curved and cutting knife may be introduced, but having the shape of a lentil, with a dull point, but cutting on its edge; it should be introduced with dexterity into the wall of the bladder so that the incision may be rapidly made. From this point, the blade comes almost in the middle and is drawn towards the upper part of the incision, dividing the recti muscles in the middle, as has already been stated, having care that nothing shall be moved during the penetration of the instrument.

"In order to accomplish this one should have ready three knives — one similar to a barber's razor, to be used for cutting the skin and fat; the other curved with a blade on one side only and dull on the convex aspect, that should be held above, in order to thus surely divide the median vesical membranes and the bladder, but one should not go too high; then only will one have ready the third knife necessary for the last incision.

"This knife should have the shape of a scythe, but with the tip dull so as not to prick the inside of the bladder nor injure the intestine in the least; for this reason it should be lenticulated, similar to the knives employed by women for cleaning the intestine in preparing tripe; one should be careful that the blade be somewhat broad but dull and without a point, nevertheless cutting well on its edge.

"Then from the pubis upwards make an incision from two to three fingers' breadth (rather less) in length; the fluid having escaped, a finger of the other hand introduced into the patient's anus pushes the calculus up towards the bladder opening, and two fingers of the other hand seize it; one may employ pincers made for this use to withdraw it. If, then, other smaller stones remain, they are to be removed, by a special spoon; if the pincers are a little bit too large a curved pliers may be employed and are very useful.

"All the parts incised may be dilated as much as desired and much more easily and fully than in the perineum, which is usually enlarged with a dilator, an instrument which makes one shiver to think of, while in the preceding method there is no fear of tearing the parts while extracting the stone."

Rousset exposes in an authoritative and complete way his operative technic; nevertheless, this is not sufficient for him, because he searched for new details

and all possible improvements that were feasible in his procedure. For instance, he describes another mode of incising the bladder, which I will describe in a few words. After having injected a tepid liquid into the bladder, a stylet is introduced into the latter by way of the urethra, upon which the soft structures and bladder are incised. If the injection is too painful on account of the sudden distension of the bladder he advises ligating the penis two or three days before the operation. It is not in our province to criticise Rousset's technic on account of its extreme simplicity, and it may also be said that it was only slightly changed by those surgeons who later on performed suprapubic cystotomy. Rousset never performed the operation on the living, but states that he has performed it many times on cadavers. Then, wishing to operate on a living subject, he endeavored to obtain from Henry III the permission to operate on subjects suffering from vesical calculus who had been condemned to death. He states that the king had offered him four patients or more, and agreed to commute their sentence if they were cured by the operation, but unfortunately the king at this time died and Rousset could not affirm that the incisions made in his technic were not lethal.

The history of medicine, and particularly that of cystotomy, readily explains why lithotomists gave up this operation for so long a time, and a few words relative to the doctrines which reigned at this time in both medicine and surgery, likewise the general traditions which weighed heavily upon the minds of the profession, may not be out of place here. Hippocrates and Galen, particularly the former, enjoyed such authority that it was an unheard-of audaciousness to rise against their doctrines, and any surgeon sufficiently daring to so do ran the risk of wrecking his reputation from the irony, sarcasm and insults

among his profession. Nothing could avail against an aphorism of Hippocrates, neither experience nor demonstration; the facts themselves did not even make a breach in the prestige of the Father of Medicine, and it was necessary that only little by little during the seventeenth century surgeons did away with the old theories and became sufficiently energetic to combat tradition. Then, and then only, they began to put in practice Rousset's ideas. Even at this epoch it is evident that their bearing is above all apparent, that they have a secret fear and repugnance to have recourse to this method; and we look upon the curious spectacle of surgeons having happily performed a suprapubic cystotomy, accepting with enthusiasm and exclusively resorting to the very complicated and painful operation of perineal incision.

In point of fact, the ancients forbade the incision of the body of the bladder — "*cuy vesica persecta . . . lethale*," — and, confident in their science and experience the lithotomists performed Celsus' operation. They reached the calculus by way of the perineum, and for them this route was the one of choice in incising the bladder. They willingly accepted the improvements made in the latter operation, but suprapubic cystotomy seems to have inspired them with such terror that it paralyzed the efforts of those who wished to disengage themselves from the ideas received and to impose upon the profession a rational method. To this motive of a general order other reasons of a particular nature, especially relating to perineal section, were added. Now in 1581, when Rousset proposed suprapubic cystotomy, it has been noted that Celsus' technic was only employed in children and in easy cases. A new method had taken its place, namely, the greater apparatus, so called, and I desire at this point to make a few remarks in order to show the state of the question at this time.

The greater apparatus was invented in 1525 by Johannes de Romnis, a physician by Cremona, and was introduced into France by Laurent Colot, who taught his art to his son Philip. Here, rapidly exposed, is the technic of the greater apparatus according to François Colot, whose posthumous work was only published in 1727 by Sénac. A deep incision is made, almost parallel to the raphé, ending near the anus, so that only the lower portion of the urethra has been incised, and the neck and corpus of the bladder are not involved. From below upwards a conductor is pushed into the bladder and on this a knife; then a dilator is introduced, and finally the pincers are inserted into the wound between two conductors and are made to seize and extract the stones. The large number of instruments and multiple manœuvres made the operation a most laborious one for the surgeon and extremely painful for the patient. But in spite of difficulties of all kinds, and a very high mortality the greater apparatus was, nevertheless, accepted in France by surgeons generally.

Laurent Colot enjoyed a very considerable reputation, but he refused to operate in the presence of surgeons, reserving the right to transmit his science to his descendants as a true patrimony, and in truth the secret was completely kept until the day when François Colot was surprised during his work by two disloyal competitors. Thus the Colots defended with energy and conviction the superiority of the greater apparatus, while their elevated situation gave great weight to their teachings. For all these reasons Rousset underwent a complete check. He could not operate on the living and, on the other hand, he came against almost unconquerable obstacles; viz., the Hippocratic tradition and the official favor which the greater apparatus enjoyed, its superiority being maintained by the king's lithotomist, Colot.

However, in 1628, a work appeared at Bâle entitled *Lithotomia vesicæ*, by Guilhelmus Fabricius Hildanus, in which the author refers at considerable length to the operation performed by Franco, "who decided to extract the calculus in the groin at the upper part of the os pubis." This gross error he reproduces in referring to Rousset, whose conclusions he also does not accept. He points out that this operation should not be attempted in all adults, because the length of one's fingers is not sufficient to bring the stone up so that it can be made to project into the groin, and he points out, not without pride, that he can demonstrate this in his museum.

Nevertheless, Hildanus accepted Franco's operation: "If the calculus is very large, . . . I prefer the inguinal incision to that made in the neck of the bladder; in point of fact, the calculus is brought up into the groin with less pain and danger than by the extraction through the neck of the bladder; of this I am absolutely persuaded, particularly in the male." The writer then gravely describes his operative technic in order to bring the calculus up to the groin and extract it. Thus, not only was Rousset unable in spite of his efforts to put his theories in execution, but there appeared a writer who altered the nature of and misrepresented his ideas to such an extent that they became quite in opposition to all anatomical knowledge. Hildanus, for that matter, puts forth his affirmations with most exquisite coolness, speaks of his museum with satisfaction and emits a conclusion which appears based on his knowledge and experience: "Nevertheless, the wound in the fundus of the bladder may cicatrize as has been observed; on the contrary, the extensive wound in the neck of the bladder cicatrizes with difficulty, and this is easy to understand since the urine coming to this spot continually moistens the wound, prevents cicatrization,

and a perpetual dribbling of urine results." From what I have said I believe it unnecessary to further expose the errors of Hildanus.

In 1635 Nicholas Piètre upheld a thesis in which he at least has the merit of having fought against the reigning ideas of his time. Taking up Rousset's operation with fewer details, and without bringing forward any new facts, he commences by proving that the bladder is not completely covered by the peritoneum when distended. Then he indicates the manner of operating and states it is not difficult to open the bladder above the pubic bone, neither is it at all difficult to remove the stone by this route. He further remarks that this method is easier for the operator and less painful for the patient and that the after-effects are less disagreeable because the wound heals of itself without dressing. In conclusion he maintains that suprapubic cystotomy is the method of choice. It is probable that Piètre limits himself to expressing this opinion without daring to put the theory in practice, although he seems to be firmly convinced of its excellence. At any event, all the works on surgery of the epoch are silent on the question of the suprapubic route and, nevertheless, this thesis must have had a certain amount of influence at the time, because Guy Patin, in a letter addressed to Bertholier in 1649, refers to it.

In 1636 Nück merely refers to Franco's operation in a few words, but four years later, in 1640, Covillard comments upon it in the following terms: "It is absolutely true that one should not found the arts on infrequent occurrences, and this happy success is rather due to the vigor of the natural faculty and to the good constitution of this young body than to the dexterity of opening or the subtility of the invention." According to his way of thinking, Rousset was a very learned physician, "who was desirous of showing

originality by edifying a theory on a happy chance, because, assuredly, the greater apparatus is the least dangerous of all the operations to which one resorts." Covillard thoroughly represents the ideas which dominated at his epoch; the greater apparatus had attained its complete perfection and its great renown at the hands of François Colot, the most celebrated lithotomist of the seventeenth century. Nevertheless, Piètre's thesis and the discussions to which it gave rise caused Colot much uneasiness, and he felt that it was necessary to act at once in order to crush the new method which was at the threshold of the entrance into practice. The physicians themselves were confused in their faith in tradition, and they were curious to know if in suprapubic cystotomy there was not a very precious resource. Thus, De Lamoignon, being desirous of satisfying them, ordered Colot, who appeared the most proper person for this mission, to undertake experiments on the cadaver and report his conclusions. It is hardly necessary to say what these conclusions were, and he states that, among other things, there were unconquerable obstacles for the performance of the operation. "The conclusion was to reject and to abandon any design that one might have of employing Franco's method for removing a stone from the bladder in the future; the operation is all the more dangerous from the fact that it is most deadly. The deliberation which was the consequence of this report by Monsieur le Président and by the administrators of the Hôtel-Dieu of Paris, the advice of the late Monsieur Brayer and other physicians of the Faculty of Paris justifies the rejection of this method."

Franco's operation was consequently condemned by the most celebrated physicians of the time, and the greater apparatus triumphed without any contest.

In 1658, Thévenin alludes briefly to suprapubic cystotomy, but it would appear from what he says

that some surgeons did not fear to resort to it. He says: "Others fill the bladder with liquid by injection, and having tied the penis, for fear that it will empty itself, they make an incision in the fundus of the bladder along the linea alba and at the same time that the urine gushes out they introduce a conductor into the bladder, along which they slide a dilator, and the dilatation being made, they seize the stone with a pincers just as is done in the greater apparatus; afterwards they dress the wound as those who operate by the perineum excepting that they do not insert a cannula."

I am under the impression that Thévenin had never seen this method employed and that it is more probable that he here makes a slightly ambiguous allusion to Rousset's writings. Likewise, in 1661, Riolan speaks in the most confused manner of hypogastric puncture, while, on the other hand, in 1675, Barbette, a famous surgeon of Amsterdam, writes quite lengthily on the suprapubic route; his reference to it I will here translate. "There is still another manner of removing the stone; the surgeon having introduced his fingers into the rectum, pushes the calculus forwards and then brings it out through the opening which has been made in the rectus muscle in the direction of its fibers, above the os pubis by means of the spoon or the pincer; if one performs the operation in this way, one should in no way fear a dripping of the urine, and besides there is a larger space given through which the stone may be withdrawn; but, however, this operation is dangerous and unfortunate in itself because if the borders of the wound made in the baldder do not become approximated against the muscles of the abdomen, an ulceration of the bladder arises, which is not only followed with a great deal of pain, but may become more incurable than the stone; the which incommodities

have been the cause that good practitioners resort to this operation less than to others."

This passage is interesting on account of the author's conclusions, and one may be led to suppose that Barbette had performed it or had seen it done, but on this point I have no further enlightenment. I am rather led to infer that he simply exposes the theoretical viewpoint, but his appreciation, even unfavorable, is to be remembered, because it shows the state of mind of the surgeons and lithotomists towards the end of the seventeenth century.

In his *Traité de la lithotomie*, dedicated to Jonnot, whose pupil he had been, Tolet states that suprapubic cystotomy had been performed on the living by Bonnet, as is evident by the following quotation: "Monsieur Jonnot told me that Monsieur Bonnet, a surgeon who formerly performed lithotomy, at the Hôtel-Dieu of Paris, had assured him that he had operated in this manner. Monsieur Petit, master surgeon of this hospital, has told me that he had seen it performed on a little girl by this same Monsieur Bonnet."

Dionis relates this fact without any comment, while on the other hand the famous English surgeon, Douglass, denied Bonnet's operation, in the first place because, as he pretended, the former only refers to it in an indefinite way, and secondly because a Paris surgeon of long practice, and who had been many years the friend of Petit, had assured one of his friends that Bonnet had never spoken of this operation. He likewise denied that the suprapubic operation was performed by Groenvelt before he had himself undertaken it. It is well to point out that Douglass was the first to revive this method and endeavored to show that he systematically and frequently resorted to this operation. On the other hand, Tolet's opinion is to be taken into considera-

tion; he obtained his information from his master, Jonnot, and having no interest whatsoever in the question, his veracity is absolutely certain. On the contrary, Douglass evidently speaks from a one-sided point of view, and further on it will be shown to what point his pride brought him. It may, consequently, be admitted without reserve that Bonnet performed a suprapubic cystotomy on the living, but we would at the same time point out that this is an isolated instance which has no consequence in the history of the operation.

From what Tolet says in his book it is evident that the operation had not advanced a single step, and it would even appear that the question had been completely eliminated from the discussions among lithotomists. In 1698, Soligen put forward certain theoretical reasons which are summed up in Deschampe's *Traité de la taille*. "He proposes to inject the bladder with air, to make the incision beside the linea alba, then to inject milk, then to introduce a hollow sound into the urethra so as to give issue to the urine. He considers that the abdominal wound should be closed with sutures, but does not distinctly indicate that the walls should be comprised in them."

We now come to Dionis, who renewed Rouset's attempts. He presents a lengthy theoretical defense of the operation and also gives a minute description of the technic. It is to be noted that, like Piétre, Dionis neglects to mention Rousset, and, nevertheless, all his ideas are freely borrowed from the latter, to such an extent that certain sentences almost seem to be a translation of the writings of his predecessor. In other words, according to my way of thinking, there is no originality in the writings of Dionis on this subject. Although rather long quotations from this author will be made, it is done in order to compare the two writers, and on the other hand in order

to bring into relief the prominent part played by Dionis' brazen plagiary of Rousset. Here is the technic advised by Dionis after the bladder has been filled with tepid water and the penis tied. "The patient is seated in a chair almost on his buttocks; a longitudinal incision with a knife is made between the heads of the recti muscles and the two pyramidals; after which, pressing the finger on the fundus of the bladder, one will feel the fluctuation of the water, which distends it, and then with a large lancet a puncture is made into this organ at this same spot. One will know exactly when the bladder has been opened by the water which will flow out, and immediately with the crochet one can withdraw the stone or introduce a long and narrow pincer into the opening by which the water flows away, and having found the stone in the bladder, it will then be easy to seize it and withdraw it through this opening. The wound will heal without any trouble, because, keeping the patient sitting almost upright in bed, the urine which continually comes into the bladder cannot rise up to the level of the wound and prevent its healing, as it does in the other two ways of operating, and what is more, the urine always finds its ordinary route for flowing off. If the wound made in the abdomen appears too large, and if it is thought that it cannot be united with these, a waxed thread on a curved needle may be passed (thus employing one suture), and on the wound a dressing of lint, a compress over this and the circular binder made with a napkin to end by the scapulary which will hold the entire dressings in place." Just as Piètre had done, Dionis discovered great advantages in this method and he points out that it is not dangerous and is easy of execution. He says: "I do not find this operation so perilous as might be imagined. On the contrary, I consider it less dangerous than the small or the

greater apparatus, all the more so that . . . the bladder is situated outside the peritoneum so that one may open without touching this membrane and without entering into the abdominal cavity."

After this praise of the suprapubic incision, it might be hoped that the writer would conclude that this operation could be performed without complication, but Dionis, who, under his personality, did not fear to expose a method renewed from Rousset, is far more prudent when passing from words to acts; for not only does he not dare to try his method, but he does not even advise it; he is of opinion that a prisoner condemned to death and having a stone must be waited for in order to operate, and he says: "This method appears the best; but before giving it the preference its superiority must be demonstrated by several experiments, the first of which might be made on some criminal condemned to death and who is the possessor of a stone. I am not the only one to approve this operation; it is the sentiment of several physicians and surgeons, and especially that of Monsieur Fagon, first physician to the king, whose approbation is of the highest order on account of his special knowledge that he possesses of nature." This was also Rousset's sentiment, which Dionis is very careful not to refer to. He wished to give to his lectures delivered at the Jardin Royal an appearance of brilliancy and originality without being morally obliged to perform the operation himself, although he refers to it in the most enthusiastic way. It may be added that this lecture was followed by a rather brutal declaration and quite in opposition with the thesis that he had just upheld, because, according to his way of thinking, the greater apparatus is "that which is resorted to the most frequently and which has been considered the best up to the present time."

From what has been said I think that Douglass is quite right when he states that Dionis is in such

little accord with himself when he says that it is very difficult to say whether he approves or disapproves of it and that he had neither the talent nor the courage to undertake it. It would seem that Dionis, after having appropriated Rousset's method, waited for a lithotomist sufficiently audacious to undertake it, and thus he saved his reputation. To sum up, it may be said that Rousset, in 1590, waited to obtain a criminal with a death sentence afflicted with stone in the bladder, in order to operate, and in 1710, Dionis, first surgeon to the then late Dauphiness, did not hesitate a minute to come to the same conclusion. The result was that the necessary subject did not present himself either to the author of genius nor to his plagiary. The latter's writings had, however, an undeniable influence because it caused surgeons of the time to become acquainted with what they supposed an original method, when in reality it was a theory emitted over a century previous.

Fehr, of Bâle, less erudite and scrupulous than Dionis, writes of the suprapubic route according to the teachings of Hildanus. Fortune, however, served him badly and he gravely repeats the ridiculous assertions of the surgeon of Berne and does not hesitate to reject this operation "which is performed in the groin (*in inguine*)." He then goes on to say: "I do dissuade its use both on account of the dangerous lesions of the abdominal muscles as well as for the wound in the bladder, without forgetting the difficulties in the extraction of the calculus; and then again union of the bladder wound is almost impossible, and one can hardly ever obtain cicatrization."

Garengeot remains in the domain of theory, at least he does not blindly accept the ancient tradition. He appears to be perfectly ignorant of Rousset's writings, or at any rate he does not publish them anew in the form of a personal dissertation. Franco's

operation appears to him legitimate because wounds of the bladder, even according to the ancient authorities, may cicatrize, and he forsees the time when suprapubic cystotomy will find its place in surgery. He says: "If I have passed this method over in silence, it is because I have never seen it practiced and today it is entirely rejected. Nevertheless, if one reflects upon the experiments that I have brought forward to prove that wounds of the bladder are not lethal excepting in those places where the urine may stagnate, one may conclude that a wound made with cutting instruments, in the fundus, may heal quite as easily as one made in the neck. And what is more, we find examples in the ancient writers, and for this reason I do not give up hope that this operation will some day be renewed and that the learned surgeons of Paris who endeavor to discover the most simple means, the surest and the most prompt for operating, will give us examples in the future; the same applies to incisions made in certain parts of the lower abdomen which they hold today in horror, but which I have seen performed by my late father with all possible success."

Thus ends what I may term the first period in the history of suprapubic cystotomy. Franco performed his operation and Rousset established the theory which remained complete but without application until the advent of Douglass.

Dionis' work obtained a great success, not merely in France, but in other countries as well. In England, James Douglass, member of the Royal College of Physicians, presented, in 1718, a paper in which he demonstrates the advantages of the suprapubic route. His brother, John Douglass, lithotomist to Westminster Hospital, seduced by this theory and more daring than the surgeons who had gone before him, undertook and successfully carried out this operation

on December 23, 1719. Proud of his success he endeavored to increase his reputation by completely adopting this method and publishing a work of considerable magnitude entitled, *"Lithotomia Douglassiana, with a course of operations."* In this work he faithfully reproduces the ideas of Dionis, and the same reproaches were made to him as to the former. He, nevertheless, denies having imitated the French surgeon, but the texts are so evident in this respect that in his *Traité de la taille*, Deschamps has placed side by side the principal paragraphs of these works and in comparing them no doubt can remain in one's mind.

Douglass shows nothing personal in his technic, but it is interesting to observe that he ignores the works of Rousset before operating, but afterwards he had knowledge of them by one of his colleagues who had returned from France. He then speaks in highest terms of Rousset's writings, but he appears to us less sincere when he denies having taken nothing of use in Dionis' book, which I have already referred to. The praise given to Rousset was quite indicated because it was in no manner embarrassing, and although Dionis is referred to by Douglass in a most scornful way, the former was in reality the direct cause of the boldness and success of the English surgeon.

In his book, Douglass relates in a very complete way the various methods of cutting for stone employed in his time, and then he takes up the technic of suprapubic cystotomy, first referring to Franco's operation. His technic consisted in introducing a sound into the bladder made of the urethra of a bull and then filling the bladder with water, after which the penis is compressed. He then incises in the median line, commencing at the upper part of the tumor formed by the distended bladder, or perhaps a little further down, in relation to the size of the stone, and this incision is

carried down to the pubis. The incision is then deepened until the fluctuation of the bladder can be distinctly felt with the fingers. The blood is then removed with a sponge soaked in hot water, after which with another knife, the point of which is pressed into the neck of the bladder until the cavity of this organ is entered, then holding the knife perpendicularly, an incision of necessary length is rapidly made towards the fundus. The stone is then either removed by the fingers or pincers. It is evident that this method described by Douglass strangely resembles the description given by Dionis and no further reference will be made.

Douglass was induced to resort to the suprapubic route because Franco, before him, had obtained a brilliant success and also because, contrary to tradition, he had noted that wounds of the bladder are not all lethal. He lengthily presents the advantages which his operation possesses, and victoriously replies to the objections which other authors made. He points out that this operation is less dangerous, that impotency never follows it, there is no incontinence of urine nor fistula; the parts incised are not lacerated and there is no hemorrhage; this operation is easy and rapid, while the operative results are good; the stone is never broken and is always found. If the calculus is adherent it may be detached with less danger, a portion of the bladder is never torn away and recovery is more prompt. From this it is evident that Douglass' plea is very complete and enthusiastic, but I believe that his conclusions in its favor are, perhaps, too hasty. In point of fact, he only records four operations in his book, one followed by death, but Douglass, persuaded by the excellency of his method and its superiority over all others, wished to perform it in public, but instead of accepting his proposition the lithotomists rejected

it with scorn as injurious to the character of the lithotomists, with one exception, and that was the famous Cheselden, surgeon to St. Thomas's Hospital. However, Douglass showed his operated patients to his colleagues and one of them upheld that the abdominal cicatrix was nothing less than that produced by a cautery!

However, several English surgeons resorted to this operation, viz., Cheselden, Macgill, Pye, Bamber and Thornhill.

In a few years Douglass' method obtained great success in England, which finally spread to the Continent. Tennigs, of Kœnigsberg, upheld a dissertation in which he claimed that the suprapubic route is the one that should be generally resorted to, but his conclusions are not based on any personal facts, simply on those of Rousset, Dionis and on the results obtained by Douglass.

More audacious, the noted Heister, of Helmstad, renewed the operation of the English lithotomist, and after having operated on a patient by Rau's method he left in the bladder a large piece of stone, which he removed on the following day by the suprapubic route. The patient died from what apparently was a pyelonephritis seven weeks later. This mishap did not discourage him and in a little dissertation published in 1728 he related some successful cases, to which he adds those of Proebisch of Kœnigsberg, who also vainly endeavored to suture the walls; those of Runge, who obtained a cure in a patient whose intestine protruded through the abdominal wound during the operation.

Douglass' teachings were with difficulty taken up in France. Reference has already been made to the remarks of Garengeot in 1720, and in the posthumous works of François Colot, which were published in 1737 by Sénac, the latter in the preface speaks with

great praise of the suprapubic operation. He was also cognizant of the writings of Douglass and Cheselden. He was likewise conversant with the experiments carried out by Thibault on the cadaver, and states that Douglass' success had brought out the operation from a kind of lethargy which closed the eyes of the profession to all novelties; but it soon became plunged again in this sleep, varying capacities of the bladder having caused disgust. Sénac goes still further and he says: "It is not on the dead body that I have made these reasonings; a surgeon of my acquaintance operated on a pig which recovered in a few days; I have been assured that there was another who undertook this operation and that the outcome was not quite so favorable." It is, consequently, most interesting to know Sénac's opinion, because he was in a position to render an unbiased judgment, but it is most unfortunate that he does not mention the name of the surgeon whom he had seen operate. In his opinion the incision of the abdominal structures presents nothing dangerous, but the incision of the bladder may be feared. However, he shows that the success of Douglass and Cheselden had demonstrated that the operation was a good one, and points out that if the suprapubic route was neglected one was thus losing a resource which might save the lives of a great many.

At this same time, Morand undertook numerous experiments on the cadaver and Winslow congratulated him on the ease of his technic, his precaution and promptitude. Other researches were also undertaken by Thibault, surgeon to the Hôtel-Dieu, and although holding this operation in considerable esteem he renounced performing it for the reason that he was more familiar with the greater apparatus. Winslow, who worked with him, was convinced of the superiority of suprapubic cystotomy, and he says

that he would unhesitatingly resort to this operation and prefers it not only as an ordinary one, but to that of Professor Rau.

Already, in 1727, Ledran proposed making a transversal incision into the bladder after having made a longitudinal one into the integuments, and further on I shall refer to his work again.

It was Morand, surgeon to the Hôpital de la Charité, who was the first in France to resort to the suprapubic operation. He was fully conversant with the writings of the English surgeons, and their operative results were quite sufficient to hold his attention. Like Thibault, Winslow and Ledran, he undertook experiments on the cadaver, but, nevertheless, he did not dare to undertake the operation. The ease of the operation, its advantages and its novelty in France caused him to be a warm partisan of it, and in 1728 he published a very learned volume on suprapubic cystotomy, but, what is most curious, at this date he only relates two instances in order to support his conviction, one being an operation performed by himself, and one undertaken by Berrier at which he assisted. His work is undoubtedly the most important on the subject published in France. Morand exposes *in extenso* Franco's case, then he gives extracts from Rousset, Douglass and Cheselden and a translation of Middleton and Macgill and an account of the operations performed by Thornhill. He states that the only reason he has not undertaken the operation is because no occasion presented itself. But this statement appears to be in absolute contradiction to the recital given by Morand further on when he operated in spite of himself. He was waiting for a favorable opportunity to perform the operation when a patient came who himself demanded that this operation be done upon him, and Morand says that he stated to the patient that this method was not

employed and that he had never performed it, but seeing that the patient was firm in his resolution he undertook it.

From all this it is evident that Morand is possessed of little merit in having performed the operation, but he was cute enough to gain great credit by it and to proclaim that this method was superior to others. He had the ardor and the enthusiasm of a timid person on whom one forces the hand and who discovers very suddenly a large number of new and original ideas.

This famous operation took place in the month of May, 1727; in other words, eight years after the first one performed by Douglass. The patient was an invalided officer, by name Duprat, who was sixty-eight years of age, with one side of his body paralyzed. Therefore, there was nothing particularly engaging in this proposition for the operator, but it was the patient himself who demanded that the operation be performed. Morand goes on to say that "I was very surprised when he declared that he wished absolutely to be cut high after the English fashion; these are his terms. He persisted in saying that he would not be cut in any other way and that he hoped to recover. I wished to know what reason caused him to be so positive in favor of this method. He replied that he had seen in a duel, an officer who received a pistol-shot in the bladder, that he had observed the urine come out by the wound and that by good care this officer had recovered perfectly." And it was this wounded officer which was the cause of the first suprapubic cystotomy in France!

Morand gave in to his obstinate client, all the more so because he found an occasion to distinguish himself and increase his reputation at little risk. Therefore, he invited Winslow and Boyer, physicians, and La Peyronie and Guérin, surgeons, and a large num-

ber of others, to witness the operation. I will now give in his own words a description of the operation: —

"I had the patient placed on the bed in such a way that the chest was lower than the abdomen, the head lower than the chest, the thighs higher than the abdomen and the legs hanging over the bed and tied at the knees to the bedposts." The bladder was then filled with hot water and the penis was held down towards the anus and pressed so that the liquid could not escape. "I placed myself on the right side of the patient, I made with an ordinary straight knife a longitudinal incision four fingers' breadth in extent into the skin and fat of the hypogastric region; this incision extended downwards to the pubis onto the root of the penis; as I cut with my right hand, the index finger of the left hand followed the knife, by which means I was guided as to the extent of the incision; I then incised the linea alba by a second incision parallel to the first, but shorter both above and below; when I had cut the aponeurotic fibers of this part down to the pubis, I felt under my finger the distended bladder; I recognized the fluctuation to the extent of two fingers' breadth; I then laid aside the straight knife and took up a curved one, and at the tip of the index finger of my left hand I pushed the knife into the body of the bladder, cutting very rapidly downward towards the pubis; I expected that as soon as the bladder was entered it would suddenly collapse when the injected liquid made its escape, but as the index finger of the left hand did not for a minute leave the instrument conducted by the right, as soon as the opening was large enough to allow my finger to pass I introduced it into the bladder and held the organ suspended, so to speak, in order to surely complete my operation.

"My incision in the bladder appeared to me about two fingers' breadth; the injected water escaped

rapidly; I then laid aside the curved knife and, thanks to the water which continued to escape, I introduced the thumb and right index into the bladder towards the neck and withdrew very easily with the fingers a stone whose surface was rough, oblong in shape, the size of a large walnut and weighing five scruples; I then introduced the same fingers into the bladder in order to ascertain if there was another stone, but I felt neither stone nor gravel.

"From the first instant of the operation up to the time of the placing of the dressings, the operation only lasted two minutes and a half, a fact which was noted by two different observers."

The patient was bled on the day of the operation and on the next. The dressings were frequently changed, but on the eighteenth day following the operation the patient threatened everybody, and being very restless much blood was passed by the penis. On the other hand, as the patient ate voraciously, he was taken with diarrhea and succumbed forty-four days after the interference. The autopsy was performed in the presence of Winslow and Boyer, physicians, and Bouquot and Houstet, surgeons. "It was easily recognized that the incision into the bladder in no way communicated with the abdominal cavity; one could not perceive at the posterior part any vestige of a cicatrix; I only recognized it in cutting the cellular tissue of the membrane covering the bladder anteriorly under the pubis, with which membrane the bladder had become intimately adherent at the point of the cicatrix, and there its tissue was a little bit harder than in the natural state."

I would also point out that no pus or infiltrated urine was discovered anywhere, and that in reality Morand was unable to discover the cause of death, and it would appear that it was in no way due to the operation itself. I assume from the description

of the patient following the operation that he was a subject of some renal lesion, probably pyelonephritis, and that the cause of death was uremia.

Although Morand's tentative was unsuccessful, the history of the case resulted in the fact that other surgeons, by witnessing the technic, undertook the operation. Six months later, Berrier, a surgeon of Saint-Germain-en-Laye, undertook its performance on a child four years of age. It was rendered more laborious on account of the crying and movements of the child, but on the thirtieth day following recovery was complete.

As the conclusions arrived at by Morand point out the same advantages as those indicated by Douglass, I will not quote them. I will only say that he is inclined to believe all stones should not be removed by the suprapubic route and that the operation should be reserved for thin patients with a large bladder and without ulceration of the organ.

Although Morand held an extremely high posision as a surgeon in France, it is astonishing to see how few lithotomists adopted his teaching. A surgeon of Montpellier, by name Rameau, published in 1729 a reply to the above-mentioned surgeon. The general character of his work is that of a man of letters who knows how to remain within the limits of a decent polemic, but it is evident that the writer has a tendency to annihilate Morand's merit, who, according to his way of thinking, was not the first to operate, and gives the credit for this to Pibrac.

In 1730 Ledran published his work on the various ways of removing stone from the bladder and it may be said that he has accomplished this in a truly scientific way. He had had no personal experience with suprapubic cystotomy, and he simply exposes the theories which appear to him good without trying to impose them upon his readers. He points out

that if the bladder is large and the stone voluminous, the suprapubic incision is the proper one to adopt, and that under these circumstances it is excellent because the urethra, neck of the bladder and its orifice remain intact, that the prostate is not lacerated, split or injured, as it is in Cheselden's operation, and in the greater apparatus which may be the source of fistula; that the wound in the bladder may easily close like any simple wound, especially if it is made at a point where, after the operation, it will not become moistened by the urine.

From his numerous experiments Ledran considers that a transversal incision of the bladder is easy to make and excellent for the patient. However, writing to Morand on November 8, 1727, Winslow does not approve this change, although it appears to him well thought out when one takes into consideration the retraction of the vesical walls behind the pubis, and he says: "I am unaware if in the living the transversal incision of the bladder can be made without violating the cellular tissue, and I should fear that two wounds which cross each other in different layers would not give sufficient space through which to withdraw the stone."

I would point out that Ledran is a mild partisan of the suprapubic route, giving his preference to the greater apparatus which he had always resorted to.

It would be too long to enter into further details of suprapubic cystotomy, which was finally more or less given up after Cheselden gave to the surgical world his new technic of the perineal operation. Then again, the suprapubic incision was finally given up by its partisans, among others Samuel Pye and Sermès in Holland. The latter was so unsuccessful with it that his right to practice surgery was taken away from him.

Cheselden, the first to follow Douglass' example, very happily improved upon the technic invented

by Frère Jacques, and he obtained such an enormous success that he resorted to it exclusively. Then Morand, always in quest of new operations, came to see him operate and returned to France full of enthusiasm, and, like Cheselden, he gave up the suprapubic technic of Douglass. The lithotomists hastened to follow his example because they thus reached the bladder by way of the perineum and no longer feared either tradition or the peritoneum, which was their constant terror. Cheselden's operation then became the only one employed and hardly any writings appeared which timidly defended Rousset's theory. Alone, Pallucci of Vienna, one of Morand's students, wrote a few original pages on this subject.

Franco's operation appears to have been completely forgotten when the eminent lithotomist Frère Côme dared to again take up experiments and then to undertake the operation. From 1758 his successes followed each other rapidly, because in performing the operation he was very prudent and was possessed of a very scientific mind. He formulated its indications and, according to the case, resorted to the perineal or suprapubic incision. He invented a number of special instruments suitable for suprapubic work and thus diminished the dangers resulting from inexperience or awkwardness of surgeons. He operated on a hundred patients and then published *in extenso* the histories of each one.

In 1775, Leblanc attacked Frère Côme with violence and reproached him for his cumbersome instrumentation. He simplified the operation and thus returned to the ideas of Rousset and his imitators. Finally, Deschamps, a most remarkable surgeon, wrote a very important work on the subject. He adopted the operative technic of Frère Côme, but he further limited the indications of the operation.

JEAN BASEILHAC, dit Frere COME,
Relig.x Feuillant né en 1703 A POEJASTRE-C en Bigorre
décédé à Paris le 8 Juillet 1782.
artem lithotomiæ amplificavit, et perfecit.

He is evidently and above all a partisan of Cheselden's operation and he endeavors to resort to it as often as possible.

To sum up, it may be said that although Franco had the fortune to first perform suprapubic cystotomy, it is to Rousset that the honor should be awarded for having made it an operation, to have described its technic and the indications. Douglass was only indirectly inspired, while Morand simply has the merit of having followed the former's example, and it is unquestionably Frère Côme who gave to the surgery of the urinary tract a most precious operation, whose technic at the present time, except for a few details, has not been improved upon.

OBSERVATIONS ON VALUE OF SPECIFIC COMPLEMENT DEVIATION REACTION IN GONORRHŒA, AS AN AID TO CLINICAL DIAGNOSIS.

JAMES A. GARDNER AND G. H. A. CLOWES,
BUFFALO, N. Y.

The complement fixation test for gonorrhœa first applied by Müller and Oppenheim and subsequently studied by Bruck, Meakins, Vannod, Wollstein, Teague, Torrey and Watabiki, has recently been given a far wider practical application by the work of Schwartz and McNeil, who employed a polyvalent antigen derived from twelve different strains of gonorrhœa. The work of these investigators subsequently confirmed by Schmidt, Keyes and Swinburne would indicate that the test possesses marked diagnostic value if a suitable antigen is employed.

The purpose of our investigation has been to determine, — (1) how far this test applied quantitively gives results corresponding with the clinical condition, and to what extent it can be relied upon for purposes of diagnosis and prognosis; and (2) to what extent this reaction may be looked upon as strictly specific for gonorrhœa, as compared with other conditions, notably syphilis, in which complement deviation phenomena are obtained.

During the past five months we have tested one hundred and eighty-five cases in parallel series, — (1) for gonorrhœa, with the antigen recommended by Schwartz and McNeil, using a slight modification of

their method; (2) for syphilis, with a non-specific antigen of the type commonly employed in the Wassermann reaction.

The sera were obtained from persons having acute or chronic gonorrhœa, from individuals suffering from other diseases giving definite deviation phenomena, notably syphilis, cancer and tuberculosis, and from a series of strictly normal individuals. We have employed throughout a polyvalent gonorrhœal antigen prepared by the method of Schwartz and McNeil and supplied to us through the courtesy of the biological research laboratory of Parke, Davis & Co. The preparation of this antigen by the method adopted by Schwartz is briefly as follows: Ten strains of the micrococcus gonorrhœa are grown on ascites agar for twenty hours, removed to an equal number of bottles for each culture and grown for a further twenty-four hours at thirty-seven degrees C. and tested as regards their purity. The growth from each bottle is then removed with sterile salt solution, shaken and extracted for eighteen hours; two tenths per cent kresol is added and the mixture, after standing for a further twelve hours, is filtered through sterile asbestos and subsequently through a Berkefeld filter tested for sterility and suitably diluted for employment as antigen.

We have used the acetone precipitated fraction of an alcohol ether extract of sheep's kidney as antigen for the comparative Wassermann syphilitic series. A rabbit anti-goat hemolytic system was employed in both cases, the concentration of the individual constituents being varied to suit working conditions. The sera tested in the experiments reported in this paper were invariably inactivated in advance by heating for thirty minutes at fifty-seven to fifty-eight degrees C. After numerous experiments in which the gonorrhœal antigen was used at concentrations ranging

from one tenth to one hundredth we finally decided to use a system consisting of five hundredths of the antigen, fifteen one hundredths c.c. of the serum, to be tested with one tenth to nine one hundredths c.c. of a twenty per cent guinea pig serum as complement and five tenths c.c. normal salt solution. After a preliminary incubation of thirty to thirty-five minutes the activity of the residual complement was tested by the addition of a hemolytic system consisting of one tenth c.c. of a five per cent suspension of goat's corpuscles and from twenty-five one hundredths to three tenths of a two per cent rabbit anti-goat serum.

The effect of variation in the amount of antigen employed is well illustrated by the following preliminary experiment, in which we compared the action of the sera of three cases: (1) chronic gonorrhœa of long standing showing Neisser; (2) a suspected case of gonorrhœa, Neisser demonstrated later; and (3) a normal. From which it will be seen that No. 2 gives an uncertain reaction with concentrations of antigen under five hundreths c.c.

Antigen concentration.	1	2	3
.1	+++	+++	—
.05	+++	+++?	—
.025	+++	+++?	—
.01	++	—?	—

In recording our results we have indicated roughly by means of the signs, +++, ++, +, —, etc., the extent of the reaction obtained. Amongst the one hundred and eighty-five cases were included one hundred and six of gonorrhœa, or with a history of gonorrhœa, forty of syphilis, eleven of cancer, three of tuberculosis and twenty-five normals.

In the series of one hundred and six gonorrhœa cases (see Table of Cases) we have twenty-three

showing +++ reaction, fifteen showing ++, twenty-three showing +, thirty-seven reported —, and seven acute cases. To expedite the presentation of our observations we have prepared tables indicating the groups of cases arranged according to the extent of the reaction obtained.

Of the twenty-three cases showing +++ reaction, twenty were examined, in eighteen of which we found intracellular diplococci microscopically, and were confirmed in our findings by the results of the blood tests, as appears from Chart No. 1.

Of the fifteen cases giving ++ reaction, thirteen were examined. In nine of the thirteen cases examined we demonstrated intracellular diplococci and were confirmed by the blood tests, as is shown by Chart No. 2.

Of the twenty-three cases showing + reaction, seventeen were examined, in eleven of which we demonstrated intracellular diplococci, and in each of these eleven cases our findings were borne out by the blood examinations, as appears by Chart No. 3.

Clinically the cases showing +++ and ++ reaction, in which we were unable to find Neisser, were cases of or gave history of gonorrhœa, but because of the difficulty in procuring smears and growing cultures we were unable to prove the presence of Neisser bacilli microscopically although the laboratory had reported positive findings in such cases.

As stated, we have found Neisser in eleven of the seventeen cases examined which showed + reaction, and of the remaining twelve, four were clinically cured. Because of the slight clinical evidence of the disease and because some of the cases were clinically cured the difficulty in getting confirmatory evidence in this class of cases was much greater than in the preceding two classes.

We believe that the +++ and ++ gonorrhœal reaction is fairly positive diagnosis of the presence of a

gonorrhœal inflammation, while a + reaction without being confirmed by clinical data, should not be taken more seriously than should a + Wassermann reaction.

This method of diagnosis we have found of great value in certain cases which appear to be clinically cured, and especially in cases of women when, unless one is sure of his ground, it is rather a delicate matter to propose an examination. In illustration, Case No. 5 presented himself for diagnosis, giving history of an attack of gonorrhœa five years previous and stating that his wife had some vaginal irritation. The urine was clear, examination of massage specimen negative. Blood was taken as a routine procedure and upon the report from the laboratory of +++ gonorrhœal reaction, silver nitrate and sounds were used and most vigorous massage. Two days following a few fields of Neisser were found, and a week subsequent there was a profuse discharge with many Gram-negative intracellular diplococci. In this case had we not been furnished the clue by the blood examination we should have overlooked entirely the possibility of the man still being in an infectious stage.

In the thirty-seven cases in which the laboratory reported "— reaction" there was but one case, No. 38, in which we had been able to demonstrate intracellular diplococci, undoubtedly Neisser, which the laboratory reported absolutely negative, as shown by Chart No. 4. The serum of this case exhibited an unusually marked hæmolytic action. Tested on two occasions at a month's interval, a hæmolysis greater than that of normal controls was exhibited in both the syphilitic and gonorrhœal series. This type of reaction, occurring as it does in a limited number of cases, is liable to introduce a disturbing factor in all complement deviation work, and is being specially investigated by one of us at the present time. It

may, however, be said that we can readily recognize this type of reaction owing to its occurrence with or without antigens. We can therefore eliminate such cases when they occur and thus exclude the risk of faulty diagnosis which might otherwise be involved.

A case of interest, No. 69, age forty-nine years, was sent into the hospital for supposed hypertrophy of the prostate with complete retention of urine. Cystoscopic examination showed a condition at neck of bladder which made us suspicious of tuberculosis, and the diagnosis by urine later confirmed our suspicion. The man was a Russian Jew and very deaf, and a history was most difficult to obtain. He ran a low grade temperature. The blood taken on entering the hospital and tested in the laboratory was found to be negative both as regards syphilis and gonorrhœa. It exhibited, however, an unusually high hæmolytic activity as compared with normal sera when tested in conjunction with either the gonorrhœal or non-specific antigen. This type of reaction, which we have designated for convenience as a double negative, had been previously noted in certain cases of tuberculosis, from which we concluded that the negative in this case might be attributable to tuberculosis. A little later a large ischiorectal abscess was discovered, the opening of which relieved the retention of urine. The abscess being treated with Beck's paste healed up, the patient gained in weight and was discharged markedly improved.

Our observations in the acute cases, seven in number (see Chart No. 5) bear out those of other observers — that the reaction does not appear until about three weeks after the appearance of the discharge. Case No. 87 stated that the discharge appeared only a week previous, but this discrepancy is doubtless explained by the fact that in first attacks many patients do not realize the presence of a discharge

until they have painful urination. The infection in this case probably was much earlier than stated.

In Case No. 85, the question arose whether the attack was a recurrence of an old gonorrhœa or an acute condition. The patient, returning from his wedding trip, presented himself with a discharge of fifteen days' duration; gave a history of an attack twenty-five years previous and no subsequent infection, and denied any exposure previous to marriage. Upon first examination smears showed a few intracellular diplococci and two days later they were found in large fields. Blood was sent twice to the laboratory and a negative report received. Patient ran a mild attack and about fifteen days following first examination the laboratory reported + reaction. The patient's wife was examined by three physicians who all reported her gonococci free. Our findings of the examination of smears and of the blood tests, which, while negative at first were positive subsequently, prove that there was an acute condition rather than a relapse. The source of the infection, however, is still a question.

We have found that the gonorrhœa reaction persists longest, apparently, in cases where there is an old scar formation. Our attention was first called to the fact by Case No. 11, which was first seen three years ago with impassable multiple stricture. During the past two years he has presented himself about once in two months for passage of sound. There has been no discharge; urine clear, and it was not suspected at the time of blood examination that it would give any reaction. Much to our surprise he gave a +++ 1–2 gonorrhœa reaction.

The persistence of this blood reaction some time after a case is apparently clinically cured may possibly be due to the survival of unsuspected organisms which still serve as a focus for development. It is,

however, highly probable that in those cases, always chronic, and generally severe, in which the reaction disappears but slowly, very deep-seated metabolic disturbances have taken place and that considerable time must elapse before the deviating bodies in question are completely removed from the system. Our investigations have covered too short a period for us to draw any final conclusions at the present time, but we propose to investigate this important question further.

In this series we have included twenty-nine cases of syphilis, all of which give a strong ++ or +++ reaction when tested by the Wassermann procedure. (See Chart No. 6.) If to this series we add three cases already enumerated in the gonorrhœal series, which exhibited strong syphilitic reaction, Nos. 18, 20 and 67, we have had a total of thirty-two undoubted cases of syphilis tested in both series. Of this series fifteen, or forty-seven per cent, show an absolute negative and eight, or twenty-five per cent, only a +, which as stated above should not be considered of final diagnostic value when testing for gonorrhœa. Thus only seven cases or less than twenty per cent of these known syphilitics exhibit a definite gonorrhœal reaction, a remarkably low percentage of cases when the number of individuals suffering from both conditions is taken into consideration. Of these seven cases, four are known to have been suffering from both diseases simultaneously, one died before any reliable information could be obtained, and we have every reason to suspect that the other two cases had a histroy of gonorrhœa.

We have tested in addition in this series, eight cases of syphilis in which the syphilitic reaction was owing to treatment or other causes insufficiently marked to be of absolute diagnostic value. Only one of these cases gave a reaction in the gonorrhœal

series over + and this case proved on subsequent investigation to be suffering from gonorrhœa.

We have tested in addition eleven cases of cancer and three of tuberculosis, none of which gave any reaction worthy of note in the gonorrhœal series; and as a control we have tested twenty-five normal individuals (many of them repeatedly), all of which proved absolutely negative in both series.

It is particularly worthy of note that in this series of one hundred and eighty-five cases, many of which have been tested several times, so small a proportion give a marked unmistakable reaction in both the syphilitic and gonorrhœal series. Those that do have almost invariably proven to be suffering from both conditions, from which we may conclude that this gonorrhœal complement deviation reaction is possessed of a marked degree of specificity and may be relied upon as an aid to diagnosis even in the presence of other diseases known to exert an effect on the complement.

Conclusions. The complement deviation reaction for gonorrhœa, when carried out with a polyvalent gonorrhœal antigen by the method recommended by Schwartz and McNeil, gives remarkably reliable results and permits of a specific differentiation even in the presence of syphilis and other diseases exhibiting complement deviation phenomena.

The cases giving +++ or ++ gonorrhœal reaction were all undoubted cases of gonorrhœa; although it appears probable, as stated above, that in certain severe chronic cases the reaction may persist for some time after a cure has been effected.

The cases giving a negative gonorrhœal reaction (with one exception previously referred to and acute cases within twenty-one days of infection) failed on examination to show diplococci and may be considered porbably free from the disease.

The cases exhibiting a +++ Wassermann reaction gave for the most part a negative reaction in the gonorrhœal series, and when a strong positive reaction was obtained there is little doubt that gonorrhœa was or had been present.

It is remarkable that in this series of one hundred and eighty-five cases, seventy of which exhibited a strong reaction in the gonorrhœa or syphilitic series, only seven cases or ten per cent gave a strong reaction in both.

A slight reaction is of unquestionable value in diagnosis, but, as in the case of a slight Wassermann reaction for syphilis, should never be considered final. We have up to the present failed to find a single normal individual exhibiting a definite reaction when tested with the gonorrhœal antigen.

In conclusion we wish to take this opportunity of expressing our indebtedness to our associates, Dr. James B. Cross and Mr. West, for their invaluable co-operation in the clinical and laboratory work, and also to the biological department of Parke, Davis & Co. for so kindly supplying us with the gonorrhœa antigen.

Table of Cases.

Case No.	Previous Attacks. Duration of Present Attack.	Clinical Condition. Date of Subsequent Examinations.	Blood Tests. G.	Blood Tests. W.	Neisser Present.
1	0. 6 mos.	P. & V.*	+++	—	Yes
2	0. 1 yr.	Post. U.**	++	—	Yes
		5 wks. later, cured.	—	—	
3	0. 2 yrs.	Chronic Post. U.	+½	—	Yes
		2 mos. later.	—	—	
4	0. 1 mo.	Subacute gonorrhœa.	+½	—	Yes
			+½	—	Yes
5	0. 5 yrs.?	Apparently cured.	+++	—	See note (1)
6	I. 3 yrs.	P. & V. epididymitis.	+++	—	Yes
		6 wks. later.	+++	—	
		3 mos. later.	++	—	
7	I. Several mos.	Urine loaded with phosphates.	—	—	No
8	0. 6 mos.	Peri-urethral abscess.	+	—	Yes
		Post. U.			
		6 wks. later.	+	—	
		3 mos. later.	—	—	
9	II. 2 mos.	Post. U.	+	—	Yes
		11 wks. later.			
10	0. 2 yrs.	Tight stricture.	+++	—	Yes
11	0. 3 yrs.	Old stricture.	++½	—	No exam.
12	0. 2 yrs.	Watery discharge. Staphylococci.	—	—	No
13	0. 2 yrs.	Prostatitis.	+½	+	Yes
		6 wks. after 606.	++	—	
14	II. 2 mos.	Chronic Post. U.	+++	—	Yes
		5 wks. later.	+++	—	
15	I. 7 mos.	Gleet.	+++	+	Yes
		11 wks. later.	+½	+	
16	II. 6 yrs.?	Gleet. Chronic P. & V.	+++	—	No
17	0. 4 yrs.?	Frequent relapses.	—	—	No
18	0.	T. B. kidney.	—	+++	No
19	I.	Nephritis.	++	—	No
20	0. 4 mos.	Urethritis. Secondary symptoms syphilis.	+++	+++	Yes
21	I. 1 yr.	Chronic Post U.	+++	—	Yes
		1 mo. later.	++½	—	
		2 mos. later.	++	—	
22	0. 1 wk.	Cured gonorrhœa.	—	—	
23	0. 3 mos.	Large caliber stricture.	—	—	No exam.
		4 wks. later.	+	—	No

[1] After blood report discharge was set up by silver nitrate and Neisser found.

TABLE OF CASES—*continued.*

Case No.	Previous Attacks. Duration of Present Attack.	Clinical Condition. Date of Subsequent Examinations.	Blood Tests. G.	Blood Tests. W.	Neisser Present.
24	0. 2 yrs.	Cured Post. U.	+++	—	Yes
25	I. 10 mos.	Frequent relapses.	+	—	Yes
		5 wks. later. Cured.	—	—	
26	I. 4 mos.	Chronic Post. U. Epididymitis,	++½	—	Yes
		3 wks. later.	+½	—	
27	II. 2 mos.	Chronic P. & V.	++	—	Yes
28	0. 4 days.	Slight discharge.	—	+	Yes
29	II. 10 yrs.	Multiple stricture.	—	—	Yes
30	0. 1 mo.	Sub-acute gonorrhœa.	+++	—	Yes
		4 wks. later.	+++	—	
		2 mos. later.	+++	—	
31	III.	Few shreds.	—	—	No
32	0. 3 mos. ago.	Patient came for diagnosis; had been cured.	—	—	No
33	0. 7 mos.	Chronic prostatitis.	+++	—	Yes
		2 mos. later.	+	—	
34	III.	Patient came for examination. Apparently cured.	—	—	No
35	III.	Burning sensation.	—	—	No exa m.
36	I. 3 mos. ago (slight).	Cured.	+½	—	Found at time of attack.
37	II. 6 mos.	Large stricture. Chronic urethritis.	++½	—	Yes
		4 wks. later.	+	—	
38	Gonorrhœa 14 yrs. ago.	Relapses (?) every 2 yrs. Chronic prostatitis.	—	—	Yes
		1 mo. later.	—	—	
39	IV. 3 wks.	Acute gonorrhœa.	—	—	No
40	0. 2 yrs.	Chronic urethritis. Staphylococci.	—	—	No
41	0. 10 yrs.	Cloudy urine; blood at times. Colon bacillus. Staphylococci.	++½	+	No
		3 wks. later.	+++	+++	
42	0. 4 wks. (slight).	Phimosis; secondary syphilis.	½+	+	No exam.
43	III. 3 mos.	Stricture. Few shreds.	+	—	No

TABLE OF CASES—*continued.*

Case No.	Previous Attacks. Duration of Present Attack.	Clinical Condition. Date of Subsequent Examinations.	Blood Tests. G.	Blood Tests. W.	Neisser Present.
44	I. 3 wks.	Inflammation verumontanum.	+	—	No
45	III. 8 mos.	Chronic P. & V.	+++	—	Yes
		1 mo. later.	+++	—	
46	0.	Marked cystitis; colon infection.	—	—	No
47	III.	Stricture; few shreds.	+	—	No
48	II. 2 yrs.	Shreds in first urine.	—	—	No
49	I. 4 wks.	Burning on urination; acid urine.	—	—	No
			—	—	No
50	IV.	Stricture; few shreds.	—	—	No
51	? 18 mos.	Chronic Post. U. stricture.	+++	—	Yes
		7 wks.	++½	—	
52	I. 6 wks.	Colon bacillus; staphylococci.	—	—	No
53	0. 2 mos.	Chronic Post. U.	+	—	Yes
		5 wks. later.	½+	—	Yes
54	0.	Red patch on glans.	—	+	No
55	I.	Large caliber stricture.	—	—	No
56	I. 3 yrs.	Frequent relapses. Chronic Post. U.	+	+½	No
57	III. 3 wks.	Profuse discharge.	+++	—	Yes
58	I. 2 mos.	Relapses (?) every 2 yrs.	++	—	Yes
59	I. 2 mos.	Stricture; chronic Post. U.	+++	—	Yes
		3 wks. later.	+++	—	
		6 wks. later.	++	—	
60	0.	Operated on for pyosalpinx 2 wks. ago.	+++		No
61	I. 6 mos.	Chronic Post. U. 5 wks. later.	+½	—	No exam.
62	V. 11 mos.	Chronic prostatitis. Staphylococci.	+	—	No
63	0. 3 wks.	Acid urine.	—	—	No exam.
64	I. 11 mos.	Has had perineal abcess every year Number shreds.	+++	—	No
65	I. 12 yrs. ago.	Large caliber stricture.	+	—	No exam.

TABLE OF CASES—*continued.*

Case. No.	Previous Attacks. Duration of Present Attack.	Clinical Condition. Date of Subsequent Examinations.	Blood Tests. G.	Blood Tests. W.	Neisser Present.
66	?	Came for examination.	—	—	
67	?	Tertiary syphilis.	+	++	
68	I. 15 yrs. ago.	Bright's.	—	—	No
69	?	T. B. kidney.	— —	— —	No
70	I. 1 year ago.	Chronic prostatitis. Few shreds.	—	—	No
71	II.	Stricture; has had two attacks gonorrhœal arthritis.	++	—	Not at this time
72	III. 3 wks.	Relapses. Few shreds.	+	—	Yes
		3 wks. later.	+	—	
73	I.	Came for diagnosis.	—	—	No
74	0. 2½ yrs.	Post. U. staphylococci.	++	—	No
75	I. 1 yr.	Relapse after each coitus. Epididymitis.	+++	—	No exam.
76	I. 1 mo.	Subacute gonorrhœa.	++	+	Yes
77	0. 3 wks.	Acute gonorrhœa.	+++	—	Yes
78	III. 4½ mos.	Chronic anterior and posterior.	+++	—	Yes
79	?	Endometritis.	+++	—	No
80	III.	Locomotor ataxia.	—	—	No
81	I. 1 yr.	Cured.	—	—	No
82	I. 1 yr. ago. Relapses.	Inflammation verumontanum.	—	—	No
83	?	Operated on for pyosalpinx 2 wks. ago.	—	—	
84	?	Operation for abcess, Douglas "Cul-de-sac."	+	—	
85	I. 10 days.	Acute gonorrhœa.	—	—	Yes
		2 wks. later.	+	—	
86	I. 18 mos.	Inflammation verumontanum.	+	—	Yes
87	I. 1 wk.?	Acute gonorrhœa.	+++	—	Yes
88	I. 3 yrs. ago.	Urethral chancre.	—	+	No
89	4½ yrs. ago.	Cured.	—	—	No
90	6 yrs. ago.	Occasional irritation; few shreds.	—	—	No
91	4 mos. ago.	Few shreds.	—	—	No.
92	3 mos. ago.	Cured.	+	—	No exam.

TABLE OF CASES—*concluded.*

Case. No.	Previous Attacks. Duration of Present Attack.	Clinical Condition. Date of Subsequent Examinations.	Blood Tests. G.	Blood Tests. W.	Neisser Present.
93	II.	Cured.	—	—	No exam.
94	II.	Cured.	—	—	No exam.
95	I.	Cured.	—	—	No exam.
96	IV. Last attack 6 mos. ago.	Cured.	—	—	No exam.
97	0. 2 yrs.	Number relapses.	+½	—	Yes
98	0. 4 mos. ago.	Came for diagnosis. Cured.	—	—	No
99	II. 5 yrs. with many relapses.	P. & V. Chronic Post. U.	+½	—	Yes
100	0. 3 mos.	Chronic Post. U.	—	—	
101	II. 4 wks.	Slight discharge.	++	—	Yes
102	0. 3 mos.	Cured.	—	+	No
103	? 3 mos.	Chronic gonorrhœa.	+++	—	Yes
104	?	Chronic gonorrhœa.	++	—	Yes
105		Syphilitic.	++	—	
106	0. 3 days.	Acute gonorrhœa.	—	—	Yes

Chart No. 1.

23 CASES WITH + + + REACTION.

Case No.	Gonorrhœal History.	Slides Examined.	Neisser Present.	Blood Tests. G.	Blood Tests. W.
1	Yes	Yes	Yes	+++	—
5	Yes, 1906	Yes	Yes	+++	—
6	Yes	Yes	Yes	+++	—
10	Yes	Yes	No	+++	—
14	Yes	Yes	Yes	+++	—
15	Yes	Yes	Yes	+++	+
16	Yes	Yes	No	+++	+
20	Yes	Yes	Yes	+++	+++
21	Yes	Yes	Yes	+++	—
24	Yes	Yes	Yes	+++	—
30	Yes	Yes	Yes	+++	—
33	Yes	Yes	Yes	+++	—
45	Yes	Yes	Yes	+++	—
51	Yes	Yes	Yes	+++	—
57	Yes	Yes	Yes	+++	—
59	Yes	Yes	Yes	+++	—
60	Yes	No		+++	— —
64	Yes	No		+++	—
75	Yes	No		+++	—
77	Yes	Yes	Yes	+++	—
78	Yes	Yes	Yes	+++	—
87	Yes	Yes	Yes	+++	—
103	Yes	Yes	Yes	+++	—

Chart No. 2.

15 CASES WITH + + REACTION.

Case No.	Gonorrhœal History.	Slides Examined.	Neisser Present.	Blood Tests. G.	Blood Tests. W.
2	Yes	Yes	Yes	++	—
11	Yes	No		++½	—
19	Yes	Yes	Yes	++	—
26	Yes	Yes	Yes	++½	—
27	Yes	Yes	Yes	++	—
37	Yes	Yes	Yes	++½	—
41	Yes	Yes	No	++	½+
58	Yes	Yes	Yes	++	—
71	No	No		++	—
74	Yes	Yes	No	+ +	—
76	Yes	Yes	Yes	++	+
79	Yes	Yes	No	++½	—
101	Yes	Yes	No	++	—
104	Yes	Yes	Yes	++	—
105	Yes	Yes	Yes	++	—

Chart No. 3.

23 CASES WITH + REACTION.

Case No.	Gonorrhœal History.	Microscopic Examination.	Neisser Present.	Blood Tests. G.	Blood Tests. W.
3	Yes	Yes	Yes	+	—
4	Yes	Yes	Yes	+	—
8	Yes	Yes	Yes	+	—
9	Yes	Yes	Yes	+	—
13	Yes	Yes	Yes	+½	—
25	Yes	Yes	Yes	+	—
36	Yes	Yes	Yes	+½	
42	Yes	No		+½	
43	Yes	Yes	Yes	+	—
44	Yes	Yes	No	+	—
47	Yes	Yes	No	+	—
53	Yes	Yes	Yes	+	+½
56	Yes	Yes	No	+	
61	Yes	No		+½	
62	Yes	Yes	No	+	—
65	Yes	No		+	—
67	No	No		+	++
72	Yes	Yes	Yes	+	—
85	No	No		+	—
86	Yes	Yes	Yes	+½	
92	Yes	No		+	—
97	Yes	Yes	No	+½	—
99	Yes	Yes	No	+½	—

Chart No. 4.

37 CASES WITH — REACTION.

Case No.	History of Gonorrhœa.	Discharge.	Physical Condition.	Diagnosis.	Blood Tests. G.	Blood Tests. W.
7	Yes	No	Burning sensation on urination. Urine loaded with phosphates.	Phosphaturia.	—	—
12	?	Yes	Both urines dirty.	Staph. infaction.	—	—
17	Yes	Gleet	Few shreds in urine.	Over-treatment; cleared up when treatment stopped.	—	—
23	Yes	No	Shreds in urine.	Inflammation verumontanum.	—	—
29	Yes	Slight	Shreds in urine.	Multiple stricture.	—	—
31	Yes	No	Few shreds in urine; prostatitis.	Prostatitis; urine cleared up after few massage treatments.	— —	— —
32	Yes	No	Few shreds in urine.	Urine cleared up when treatment discontinued.	—	—
34	III	No	Urine clear.	Cured.	—	—
35	III	No	Urine dirty; prostatitis.	Prostatitis; urine clear after few massage treatments.	—	—
38	I	Yes	Urine dirty; discharge at meatus.	Chronic gonorrhœa. Neisser found.	—	—
40	Yes	Yes	Urine dirty; prostatitis.	Cleared up and cured after three treatments.	—	—

Chart No. 4—*concluded.*

Case No.	History of Gonorrhœa.	Discharge.	Physical Condition.	Diagnosis.	Blood Tests. G.	Blood Tests. W.
46	Yes	No	Cystitis; prostatitis.	Colon infection; improved under vaccine.	—	—
48	Yes	No	Number of shreds in first urine.	Desquamating epithelium.	—	—
49	Yes	Yes	Frequent urination; smarting.	Acid urine.	—	—
50	Yes	Yes	Frequent urination; urine full of shreds.	Stricture.	—	—
52	Yes	Yes	Profuse discharge.	Staph. infection; cleared up under vaccine.	—	—
55	Yes	No	Few shreds in urine.	Old stricture. Cleared up after dilatation.	—	—
63	No	Yes	Slight discharge after suspicious intercourse.	Cleared up with one treatment.	—	—
68	Yes	No	Cloudy urine.	Chronic nephritis.	—	—
69	No	No	Urine dirty; retention; t. b. in urine.	Tubercular.	—	—
70	Yes	No	Few shreds in urine.	Chronic prostatitis.	—	—
73	Yes	Slight	Meatus sticks together.	Strain.	—	—
80	Yes	No	Dirty urine.	Locomotor ataxia.	—	—

81	Yes	Slight		Inflammation verumontanum.	—	—
82	Yes	Slight		Inflammation verumontanum.	—	—
83	Pus tubes.	No				
88	Yes	Slight	Slight discharge.	Secondary syphilis.	—	+
89	Yes	No	Cured.	Cured.	—	—
90	Yes	No	Occasional irritation; few shreds:	Inflammation verumontanum.	—	—
91	Yes	No	Few shreds.	Cured.	—	—
93	Yes	No	Cured.	Cured.	—	—
94	Yes	No	Cured.	Cured.	—	—
95	Yes	No	Cured.	Cured.	—	—
96	Yes	No	Cured.	Cured.	—	—
98	Yes	No	Cured.	Cured.	—	—
100	Yes	Slight	Shreds in urine.	Chronic prostatitis and vesiculitis.	—	—
102	Yes	Slight	Slight discharge.	Endometritis	—	+½

Chart No. 5.

7 ACUTE CASES.

Case No.	Duration of Discharge before Blood Tests.	Blood Tests. G.	Blood Tests. W.	Neisser Present.	Clinical Condition.
22	2 dys.	—	—	Yes	Cured after 17 dys.
28	3 dys.	—	—	Yes	Cured after 13 dys.
39	9 dys.	—	—	Yes	Cured after 12 dys.
77	17 dys.	+++	—	Yes	Mild attack.
85	10 dys. 15 dys. later.	— +	— —	Yes	Mild attack.
87	1 wk. (?)	+++	—	Yes	Severe attack.
106	3 dys.	—	—	Yes	Severe attack.

Chart No. 6.

27 SYPHILITIC CASES.

Case No.	Blood Reaction. Wassermann Test for Syphilis.	Blood Reaction. Gonorrhœal Test.	History.
110	+++	—	Tertiary syphilis.
111	+++	—	Secondary syphilis.
112	+++	++	Tertiary syphilis. History of gonorrhœa.
113	+++	+++	Tertiary syphilis. Gonorrhœa denied.
114	+++	++	Tertiary syphilis. Gonorrhœa probable.
115	+++	—	Secondary syphilis.
116	+++	—	Secondary syphilis.
117	+++	—	Tertiary syphilis.
118	+++	+	Secondary syphilis. No history of gonorrhœa.

CHART No. 6—*concluded.*

Case No.	Blood Reaction. Wassermann Test for Syphilis.	Blood Reaction. Gonorrhœa Test.	History.
119	++	—	Tertiary syphilis. Cured of gonorrhœa.
120	++	+	Secondary syphilis.
121	++	—	Secondary syphilis.
122	++	++	Tertiary syphilis. Gonorrhœa.
123	+++	+	Tertiary syphilis. No history of gonorrhœa.
124	++	—	Tertiary syphilis.
125	+++	—	Tertiary syphilis.
126	+++	—	Secondary syphilis.
127	+++	—	Secondary syphilis.
128	+++	+	Tertiary syphilis. Gonorrhœa improbable.
129	+++	—	Secondary syphilis.
130	+++	+++	Tertiary syphilis.
131	+++	+	Tertiary syphilis.
132	+++	—	Tertiary syphilis.
133	+++	—	Secondary syphilis.
134	+++	—	Tertiary syphilis.
135	+++	+	Secondary syphilis.
136	++	++	Secondary syphilis.

EXPERIENCES WITH THE GONORRHŒAL COMPLEMENT FIXATION TEST.

R. B. H. GRADWOHL,
ST. LOUIS, MO.

I wish to present for your consideration a verification of the statement already made in the excellent paper of Schwarz and McNeil[1] on the usefulness of the complement fixation test of the blood in supposed gonorrhœal infections. Clinical experiences with this test were presented before the last meeting of this Association by Swinburne and Schmidt.[2]

The test in my hands has proven eminently satisfactory in the conditions indicated in these prior publications. It is hardly necessary for me in addressing an audience of experienced urologists, to state that this test represents an attempt made to bridge over the gap in exact bacteriologic diagnosis left by smear and culture methods in deep-seated and long-existing inflammatory conditions in the urethra and contiguous anatomical structures.

Keyes, in his admirable paper presented before the last meeting of this Association in Chicago, called attention to the limitations of the methods for searching for and finding the gonococcus in material from the pathological conditions of the lower uro-genital tract. The very fact that we have called upon the serologist to help us out in these conditions indicates clearly that there must be some difficulty in finding,

[1]American Journal of the Medical Sciences, May, 1911.
[2]Transactions American Urological Association, 1911, No. V.

in identifying and in differentiating the gonococcus as we see organisms on the stained slides or in culture tubes. At the risk of appearing academic it must be said that at times we are unable to find the gonococcus in material in which the strongest suspicion tells us it is hiding, and that at other times, even with the differential Gram stain and with supposedly favorable culture material, we are reluctant to unequivocally pronounce the diagnosis of gonorrhœal infection.

We know that we do not always succeed in delivering the gonococcus from patient to slide; we also know that we do not always induce the gonococcus to grow even scantily upon our culture media, however much we may attempt to pamper its taste by offering it favorable pabulum in the shape of human blood, dog serum, serum-agar or what-not. The presence of inhibiting organisms, too long exposure of the material to the cold, the absence of favorable factors and maybe the presence of unfavorable elements, all conspire at times to render our attempts futile. We have therefore been constrained to turn from the disappointments of the Koch methods to the brilliant serological procedures which have stood us in such good stead in the diagnosis of syphilis, typhoid, glanders, etc.

A study of a series of fifty cases seems to demonstrate that the gonorrhœal complement fixation test is of definite value in making certain the diagnosis of the presence of the gonococcus in "chronic" urethral infections, in supposed gonorrhœal infections of a chronic nature in the female and in that group of complications classed as arthritis blenorrhagica. My colleagues, Drs. Bransford Lewis, W. W. Graves, H. J. Scherck, F. J. Taussig and G. Gellhorn, were good enough to furnish me with some of this material from which this study was made. I wish to express my sense of indebtedness to them for their kindness

in this regard. The technique used in the tests was that known as the straight Wassermann technique, using the anti-sheep system, with an antigenic extract made from twelve different strains of the gonococcus furnished me by the laboratory department of Parke, Davis & Company, a courtesy for which I am extremely grateful. It is vital to use a number of different strains of gonococcus for this work and it is no small task to keep these organisms in so many different strains under cultivation. This extract was put up in one c.c. glass bulbs and was found fairly stable. These twelve different strains "cover" all the different possibilities represented by the presence of antibodies of different nature developed by the various gonococci at large or in captivity on this continent. This antigenic extract is made by growing the different strains of gonococci, rubbing them off the media, putting them in sodium chloride suspension and filtering through a Berkfeld filter. The amount to be used, together with the amounts of complement and hemolytic amboceptor, were determined by the regulation titration methods used in serological laboratories. Fresh guinea-pig serum was used throughout as the complement, never more than twenty-four hours old. As a positive control, I used at first antigonococcic serum as prepared by Parke, Davis & Company, later the sera of cases shown to be positive by this test. The total volume of fluid in each tube in this technique was two and five tenths c.c. The hemolytic amboceptor had a potency of hemolysing of one c.c. of a five per cent solution of freshly washed sheep corpuscles in a dilution of one to one thousand, just as is required in the Wassermann test. The amount of patient's serum used was 0.2, 0.15 and 0.05 c.c., inactivated for thirty minutes at 56° C. A number of controls were made, using the sera of healthy people and of cases which were being examined for clues by the Wassermann method.

It may be stated here that in no instance was the test found positive in the control sera. The series comprised eighteen cases of acute anterior urethritis, four cases of "tubal trouble," three cases of chronic urethritis and cervicitis in the female, in which it was not possible or feasible to find the gonococcus by microscopic or cultural methods, one case of vulvo-vaginal abscess, one case of vulvo-vaginal abscess with a luetic infection as well, fifteen cases of long-standing deep urethral, prostatic and seminal vesicle infection, in some of which the gonococcus was found by the ordinary methods, in others it was not. I wish to emphasize the point again that these were all cases of infection that had been existing for a long time. In this group there were three candidates for marriage, who, at first glance, might have been said to have been clinically "cured," yet all showed a positive gonorrhœal complement fixation test; in all three, clinical symptoms afterwards reappeared to bear out the assumption that the cases were not cured, in serological terms. There was ample justification here for regarding the gonorrhœal complement fixation test as a court of higher resort than that furnished by the clinical manifestations.

Another case, not included in this series because it has not been thoroughly studied, showed a "morning drop" for over a year, yet, owing to the medical attendant's failure to find the gonococcus in smears, the patient was insistent upon making a proposal of marriage to a lady who was about to leave the country on a long trip to the Orient. He was anxious to "pop the question" at once, prior to the bride-to-be's departure, which, in the event of an acceptance, would have necessitated a marriage on short notice. Here the gonorrhœal test stepped into the breach. Alas for the gentleman's ardor, it proved positive. He reluctantly yielded to the advice of his physician,

held his peace and abstained from offering his hand in marriage.

The eighteen cases of acute gonorrhœal urethritis in this series showed a negative reaction throughout the entire course of the disease. These were all anterior infections which of course should never show a positive reaction, because anti-bodies are not formed in the blood from such cases. The test, moreover, is hardly needed in the diagnosis of such cases, nor do we as a rule find much difficulty in estimating a cure of these cases. Of the four cases of supposed gonorrhœal arthritis, three gave a positive reaction, one a negative. One case showed a positive gonorrhœal complement fixation test and a positive Wassermann test. Improvement has followed the institution of anti-syphilitic treatment in this case. There was an old urethral infection here which might have been responsible for the joint disturbance.

One of these joint cases is interesting as showing that the twelve strains of gonococci used in making the antigenic extract must have included the gonococcus coming from a far distant country, for the patient, a gentleman infected while sojourning in the island of Ceylon, developed acute gonorrhœal urethritis which became deep-seated after a while, complicated by epididymitis. While travelling through France on his way home, he was seized with a monoarticular arthritis of the left ankle joint, just two months after the beginning of the gonorrhœal infection. Treatment with rest, collodial silver, etc., enabled him to proceed on his way to America, although his joint trouble persisted, as did his urethritis. Three months after the onset of the joint affair, his blood gave a positive gonorrhœal complement fixation reaction, his urethral discharge showing at the same time numerous gonococci. The use of antigonococcic serum, with appropriate attention to the urethra, was fol-

lowed by a cessation of symptoms. Six weeks later both clinical and serological cure seemed to be complete.

Of the four cases of tubal trouble, three gave a positive, one a negative. Operative interference in all these positive findings confirmed the accuracy of the gonorrhœal diagnosis, with but one exception, and that in no way vitiating the value of the positive reaction found here. Here was a case diagnosticated as pus tube; a tubo-ovarian cyst was found at operation, no pyosalpinx; nevertheless, a chronic existing cervicitis which we had here might have been responsible for the positive blood reaction. One case of gonorrhœal pyosalpinx gave first a positive and later, after one month's rest and conservative treatment by Dr. Gellhorn, a negative reaction. At the time of operation, a pus tube was removed and some pus spilled into the pelvic cavity, yet my gynecological friend, possibly emboldened by the final negative blood finding, sutured the abdomen without drainage. The case made an uneventful recovery. Of course we know that this has been done before, that pus from gonorrhœal pyosalpinx cases has been smeared upon the pelvic peritoneum apparently without doing damage. I mention it merely to question the wisdom of accepting a negative blood-finding in a case of this kind as proof positive of the innocuousness of pus spilled on a pelvic peritoneal surface.

The three cases of chronic urethritis, cystitis and cervicitis were old cases in which, owing to the abundance of bacterial flora in the vagina, the gonococci could not be definitely isolated. Blood test was positive in all three instances. One case of vulvo-vaginal abscess showing a positive reaction disclosed gonococci in the evacuated pus. Forty days afterwards, the blood showed a negative reaction. The other case of vulvo-vaginal abscess in this series was

first observed but a week ago, showing a positive gonorrhœal and luetic complement fixation reaction. No data, therefore, can be given in this instance concerning the length of time the gonorrhœal anti-bodies will persist after thorough surgical procedures have been carried out.

Among the fifteen cases of deep infection, twelve were found positive and three negative. These cases all represented old infections of from six months' to six years' standing. In eight out of the twelve, the positive reaction still persists, with persistence of their clinical symptoms. Four represent clinical and serological cures, because their symptoms have disappeared and their bloods show negative reactions after repeated tests extending over a period of time of from three weeks to three months after cessation of treatment.

From a study of the publications cited and these selected cases, it seems warrantable to draw the following conclusions: —

1. This seems to be a valuable test for occult gonorrhœal infection.

2. It is not present in acute anterior gonorrhœal urethritis, naturally, because no anti-bodies seem to be developed in the blood of individuals with short-lived anterior infections. Infection apparently must be posteriorly situated and long-lived before anti-bodies are developed in amounts sufficient to bind complement in the presence of an analagous antigenic gonorrhœal body.

3. If we are dealing with an organism the nature of which we cannot absolutely determine by morphological or biological characteristics, then a blood examination of a person harboring such bacteria might accurately enable us to label the organism as the gonococcus.

4. A blood which has been positive and then becomes negative and remains negative may be assumed

to represent a cured case of gonorrhœal infection. How soon a blood should become negative after a subsidence of clinical symptoms and an actual death of the gonococcus in the infected organism is a question unanswerable at this moment. Experience with these and other cases reported shows that ordinarily one obtains negative reactions within thirty days after clinical cures have been pronounced. Beyond this, we cannot definitely answer the question.

5. The test is particularly advantageous in the female, where, for many reasons, demonstration of gonococci is exceedingly difficult and, at times, a matter of grave importance to the physician, the patient and perhaps the family happiness. The test may well be accepted in cases presenting medico-legal features, always providing, of course, that the case has existed long enough for anti-bodies to form. We can all of us well imagine cases where the arch female enemy stamped with a suspicion of gonorrhœal infection, which she naturally indignantly denies, may be haled before a serological tribunal, there to be judged and accurately condemned or acquitted, according to the positive or negative character of the reaction. We can substitute actual scientific evidence instead of the circumstantial which has heretofore been used.

6. The operating surgeon will find the test useful in differentiating between a gonorrhœal and a non-gonorrhœal pus collection in the female pelvis. This is a matter at times of considerable importance.

In closing, I cannot refrain from saying a word or two that is close to the heart of every serologist who attempts to assist in making up a diagnosis; namely, that there are limitations to every laboratory test which both the serologist and the clinician should constantly bear in mind, else excellent technical diagnostic means may fall into undeserved disrepute.

Just as has been the fate of the Wassermann reaction for syphilis in some quarters, so may the gonorrhœal complement fixation test be besmirched by falling into the hands of unskilled, incompetent or irresponsible workers. This latter possibility of course far outweighs the actual limitations of the test already outlined throughout the paper. On the one hand, the limitations of the test must be remembered; on the other, the personality and ability of the individual who performs it. Serological manipulations require skill, patience and above all, time. Some control should be exercised over the worker in serological diagnoses by sending him unknown bloods, by sending divided specimens of the same blood; in short, without at all reflecting on his honesty, he should be constantly kept on the qui vive of anxiety to do painstaking work with the minimum of error. The clinician-urologist should be in close touch with the laboratory, should understand the entire technique of these tests, so that he may always be in a position of judge, ready to observe errors or carelessness. A blind acceptance of any findings which may make or break a diagnosisis is an attitude strictly to be abhorred by every clinician. He should worship no fetish, should stand ever ready to give to every sign, every symptom, every test, its proper weight and no more.

Comparing the gonorrhœal complement fixation test with the Wassermann, one finds some advantages of the latter over the former, and vice versa. The gonorrhœal test is a genuine antigen-antibody test, absolutely specific, whereas the Wassermann is dependent upon the binding of complement in the presence of syphilitic serum plus a chemical substance not necessarily derived from syphilis at all, to wit, phosphatid of lecithin, as furnished by guinea-pig heart, ox heart, liver, etc., human heart. The dis-

appearance of a gonorrhœal complement fixation test seems to indicate a cure, whereas we know with certainty that a negative Wassermann or a series of negative Wassermanns mean nothing of the sort for syphilis. The Wassermann test when positive means usually a syphilitic infection; when negative, one cannot exclude syphilis. The gonorrhœal blood test is not present in acute anterior urethritis of gonorrhœal nature, hence a negative in such a case would be of no value. The gonorrhœal test, when once positive and later negative, enables us to form a conclusion as to cure. We have still to find in gonorrhœa an allergic phenomenon similar to the Von Pirquet in tuberculosis and the luetin test of Noguchi in syphilis. Possibly it may soon be found, when we will have another means of gonococcic diagnosis.

Irons recently[1] calls attention to a cutaneous reaction in gonorrhœa as a result of vaccine injections, originally observed by Bruck in epididymitis, Reiter in pelvic infections, in women. We shall certainly gain additional information from such a test, yet this, like the gonorrhœal complement fixation test, properly performed and exactly weighed for its true worth, must be interpreted, as our German friends say, "Mit Verstand."

[1] Journal A. M. A., March 30, 1912

FURTHER REPORT ON THE GONORRHŒAL COMPLEMENT FIXATION REACTION.

LOUIS E. SCHMIDT,
CHICAGO, ILL.

During the past year my interest in this work has continued. Some of the features that have been noted, as well as some of the changes in the routine of the test since last year's report, are of interest to those who are working in this field, and hence, I believe are of sufficient importance to be recorded. Furthermore, I believe that in a series of cases collected for statistical purposes and for comparison of results, the technique should be the same in all instances; otherwise differences in the minute intricacies of the test might be the cause of incorrect statistics, and hence, confusion and discredit might arise.

Dr. Matthies has done all of the laboratory work. The antigen, furnished by Parke, Davis & Company, is tested in varying amounts (say from one five hundredth to one tenth of a cubic centimetre), and that quantity is used in making the reaction which is found to inhibit hæmolysis in half strength with a positive serum, but which will not inhibit hæmolysis in double strength with a negative serum; however, it should inhibit hæmolysis with a negative serum in triple stength. For example, we test varying quantities from one five hundredth to three tenths c.c. of the antigen with both positive and negative serum. We will take it that hæmolysis is inhibited in one two hundredth c.c. and all above that point with positive serum, and with negative serum inhibition

occurs only with three tenths c.c. Then one tenth c.c. is the proper amount of antigen to use in making the reaction, because two tenths with a negative serum does not inhibit hæmolysis, while three tenths does, and with a positive serum one twentieth c.c. will inhibit hæmolysis.

The test is carried out in the same manner as the Wassermann test, using both positive and negative control sera and an individual control of each serum to be tested. For the negative control serum it is preferable to use the blood of a person who has never had gonorrhœa, but lacking this, a serum is used that was negative to a previous test. For the positive control a serum is used that was strongly positive on previous testing, or the commercial anti-gonococcic serum may be used. This anti-gonococcic horse serum is usually very anticomplementary and must be thoroughly inactivated. Heating for thirty minutes at 56° C. (as in the case of fresh human serum) is not always sufficient, but forty-five minutes at this temperature generally is.

It has been our experience that tests made as described above would react promptly and be comparatively easy to read immediately after removal from the incubator; but after standing for an hour or two the positive reactions would be less distinct and in a still longer time would disappear altogether, and this would occur even at refrigerator temperature. This does not obtain in the Wassermann reaction, and in comparing the two tests, it occurred to us that the antigen for the Wassermann is an alcoholic preparation, while the gonorrhœic antigen is not. We therefore made comparison tests in about fifty cases, using in one a drop of alcohol and carrying the other through in the usual manner. We found, without exception, that the tests of the same serum were identical upon removal from the incubator,

but after standing for some time positive tests with alcohol remain legible much longer than those without the alcohol.

Before discussing my series of cases, I wish to draw your attention to some of the work done by Dr. Carl Warden, of Los Angeles, who has spent the past seven months in the Research Laboratories of Parke, Davis & Company, devoting his time to the investigation of the medium which I referred to in my last communication. In a personal letter from Dr. Warden, he has given me a resumé of the various culture media which he has tried out and the animal and other experimentation which he has done with the gonococcus. He discusses the advantages and disadvantages of blood agar, ascitic agar, salt-free ascitic agar, Dorset's egg medium and Ringer's solution. This last-named is the medium which, with certain modifications, he has found to be best. He says: "This medium alone is not satisfactory, for the reason that it will not support all strains of gonococci, and it is difficult to centrifugate; but when a small drop of freshly drawn blood is added to the surface of the medium it serves admirably, supporting all strains of gonococci, which grow near the surface, while all other ordinary urethral organisms migrate to the bottom of the tubes in white stalactite-like streamers. It has the added advantage of preserving gonococci for a long period, the organisms having been recovered from it in subculture after thirty days. This is probably due to the calcium salts present."

While I am on the subject, you may be interested to hear what he says of animal experimentation: "Work has been carried on with fifteen strains of micrococcus gonorrhœa upon dogs, rabbits, rats, frogs, guinea-pigs and monkeys. In no animal has a specific inflammation been induced in the eyes or genitals by ordinary methods of infection. All ani-

mals can be killed by the autolysates of the organisms in salt solution, or by introducing very large numbers of live organisms into the circulation." After discussing these animals in more detail, he goes on to say: —

"Guinea-pigs, thus far, hold out the only hope for the study of immunity and therapeutics. Although in no instance have genital or eye inflammations been induced, greater success has followed repeated and patient attempts to produce septicæmia in them. At the present time a definite and perfectly regular peritonitis and septicæmia have been produced in pigs of two hundred and fifty grams average weight by gradually rendering mixed strains of gonococci accustomed to a new environment. A minimum lethal dose is being gradually approached and the strain is becoming more and more virulent for these animals. The duration of the infection is brief, being invariably fatal in twenty-four hours, to which end, no doubt, the toxæmia largely contributes. The lesions leave no doubt as to the genuine nature of the septicæmia. The study is by no means complete, but the lesions are known to comprise the following: —

"A moderate degree of peritonitis, with lymph, particularly abundant about the liver, and a bloody serous exudate of about five to ten c.c. average. Hæmorrhagic kidneys and lungs. Congestion of liver and spleen. A low grade endocarditis. Gonococci are demonstrable in the heart's blood, liver, spleen and kidneys. (Gonococci have been recovered in every instance from the heart's blood post mortem.) Pigs that have died in the infection have been transferred to cold storage if autopsy could not be done within a short time, because it has been found that gonococci perish rapidly in dead pigs kept at room temperature, but remain well preserved at 34° F.

"At the present time experiments are being tried to determine the prophylactic and therapeutic effects of various immune sera, and of vaccines of the gonococcus and the closely allied organisms, the meningococcus and micrococcus catarrhalis. It is hoped that some definite observations may be made at a later date.

"The relation of the gonococcus to the polymorphonuclear leucocyte is of great interest and importance. There is no proof that the phagocyte ever destroys the gonococcus. So long as the phagocyte remains unbroken and uninjured, it not only protects that organism, but becomes its proper host and carrier. Any substance which will at once destroy the leucocyte, liberate the gonococcus and destroy it, and favor the solution of inflammed or damaged tissues without damaging healthy tissues with which it may come in contact, should be valuable as an adjunct to local therapy. It is useless to expect any medicament to influence the cocci which are already within the cells of the tissues. The substance which most nearly fulfills the requirements enumerated is a one in ten thousand solution of hydrochloric acid in distilled water. At a later date I shall publish observations showing that this solution is harmless to healthy mucous surfaces, is fatal to gonococci almost immediately, produces lysis of the leucocytes and of all tissues from which the oxygen supply has been reduced (inflammation) by causing an edema in them. Data as to agglutination properties of immune sera are being assembled.

"It is of interest that the strain of gonococcus fatal to guinea-pigs has undergone some modification from the original strains employed. The cocci from the heart's blood of pigs maintain their morphology, general characters and staining reactions, but show a marked diminution in autolysis. This strain also

grows well on plain nutrient agar, one culture now being in the eighth subculture on that medium."

I, personally, am awaiting Dr. Warden's report of his investigations with considerable impatience, and I trust you will not take it amiss that I have quoted at length from his letter.

To come back to the complement fixation reaction. I wish to state that the character of the cases — that is, the clinical history — is not known to the assistant at the time the test is undertaken. Only recently have the clinical findings been compiled especially for this report.

This series comprises one hundred and three cases, all taken from my office practice. I have excluded all the tests made on hospital and dispensary patients, for the simple reason that they are not dependable. From a clinical viewpoint the cases have been arranged in four groups: —

No Gonorrhœa.		Acute Gonorrhœa.		Chronic Gonorrhœa.		Clinically Cured Gonorrhœa.	
34 Cases		3 Cases		24 Cases		42 Cases	
+	—	+	—	+	—	+	—
0	34	0	3	17	7	5	37
0	100%	0	100%	70.88%	29.12%	11.2%	88.8%

Group I. These thirty-four cases were all individuals who denied gonorrhœal infection, and were clinically free from any sign or symptoms of gonorrhœa. The test was negative in every instance, which I believe bears out the truthfulness of their statements as well as the correctness of the clinical findings. All of these cases were under treatment for some condition other than gonorrhœa. Some were suffering from syphilis, and others from skin diseases, such as lichen planus, psoriasis, ring-worm,

acne and eczema. No individual case in this group requires any further remarks.

Group II. Here we have three cases in individuals suffering from their first gonorrhœa; at least, they denied all previous infection. The test was made in the second week of the attack in each instance, and all were negative. This is the result one would expect from previous papers on the subject, and is in accord with the theory of the formation of anti-bodies.

Group III. Twenty-four cases of chronic gonorrhœa, of which seventeen, or 70.88 per cent, were positive and seven, or 29.12 per cent, were negative. All of these patients had had one or more previous attacks of gonorrhœa and suffered from recurrent attacks of discharge and minor complications, nearly all having posterior adnexal trouble and a few having epididymitis. In all these cases the gonococcus was found within thirty days previous to the making of the test. In all but three cases, the test was positive when the gonococci were found in the same week that the test was made. Search for the gonococcus was by ordinary microscopic examination, and in a few instances by Gram's method. Cultural tests were not made.

Case 1. First infection in 1889. Numerous new infections and a great many recurrences. Examination showed involvement of the urethral follicles and posterior adnexal complications. Gonorrhœal complement fixation strongly positive.

Case 2. Had gonorrhœa two years previous to the test and practically well ever since — only shreds in the urine. Gonorrhœal complement fixation test showed fifty per cent of inhibition of hæmolysis.

Case 3. Severe gonorrhœal arthritis and gonococci present in urethral discharge. Gonorrhœal complement fixation test showed seventy-five per cent inhibition of hæmolysis.

Case 4. First and only gonorrhœa five years ago; has been under treatment more or less ever since, and now has an undoubted gonorrhœal infection of the left kidney. Gonorrhœal complement fixation test, only twenty-five per cent inhibition.

Case 5. Cervical discharge, evidently of six months' duration; gonococci present in enormous quantities (having invaded at least twenty per cent of the pus cells and many extracellular besides). Gonorrhœal complement fixation test very strongly positive.

Case 6. A woman with a fistula in ano. Gonococci present in the discharge from the fistula. Gonorrhœal complement fixation test showed fifty per cent of inhibition.

Case 7. First and only gonorrhœal infection six years ago; this became chronic and many complications developed. Finally gonorrhœal arthritis set in. Has had all sorts of serum and vaccine treatment as well as the routine treatment recommended for such cases. No gonococci were found at the time the test was made, but the gonorrhœal complement fixation test shows seventy-five per cent inhibition.

In the following three cases the test was negative, although they are undoubted chronic cases, and the gonococci were present in each instance. I am not in a position to explain this discrepancy.

Case 8. Several attacks of gonorrhœa four or five years previous. A new infection on April 10, 1911, and the test negative on July 23, 1911. No gonococci were found at the time the test was made, but his physician writes that he found them the following week and for several weeks thereafter.

Case 9. Infection on December 5, 1911, with gonococci present continuously until February 6, 1912. The test was negative on January 16, 1912.

This case might possibly be classed as an acute affair, but the interval between infection and test was greater than four weeks, so we arbitrarily placed it here.

Case 10. Infection June 15, 1911; developed epididymitis on June 17, 1911. At this time there was no discharge. Test negative on July 21, 1911.

Group IV. This group contains forty-two cases, with five, or 11.2 per cent, positive, and thirty-seven, or 88.8 per cent, negative. These patients were, for the most part, examined for conditions other than gonorrhœa, but in the course of the history it was elicited that they had had gonorrhœa anywhere from one to thirty years previously. Some of these apparently were without complications and had received comparatively little treatment, while others were severe cases requiring a great deal of treatment, and had many complications. Still others were candidates for marriage who had shreds in the urine, and were treated simply to remove every vestige of urethral or adnexal trouble. All of them were cases clinically well and the gonococcus had been absent in every instance for more than a year. The five patients in this group who had a positive test received no test treatments to make sure of the clinical absence of the disease.

Case 11. Patient fifty-five years of age. He was seen six months before the test was made for symptoms of bladder irritation, probably tabetic in character. History of gonorrhœa thirty years ago and no history of any gonorrhœal condition since that time. Gonorrhœal complement fixation test, seventy-five per cent inhibition. On account of the suspected tabes a Wassermann was made and this was strongly positive.

Case 12. Last attack of gonorrhœa in 1899. Now suffering from severe myositis and tendosy-

novitis in the calf of the leg. No urethral infection. Gonorrhœal complement fixation test strongly positive.

From this small series of cases it is true that no positive statements can be made. Yet, since I am positive that the laboratory work has been carried out by Dr. Matthies in a careful and painstaking manner, and since the clinical situation, particularly as concerns the gonococcus, has been fairly well looked into, I am inclined to believe that these one hundred and three cases can be safely used for statistical purposes.

In Group I the test was not found positive in any case where gonorrhœa could be positively excluded.

Group III shows a high percentage of positive reactions in chronic cases, particularly when the gonococcus is actually present.

Group IV shows a large percentage of negative reactions in cases that are clinically cured. In my opinion, this result indicates that a negative test in such a patient is good evidence that the disease is cured. This percentage also tends to show that the number of those who remain over a long period of time in a condition to infect with gonorrhœa is far smaller than was formerly supposed.

DISCUSSION

OF PAPERS OF DRS. GARDNER, GRADWOHL AND SCHMIDT.

DR. GEORGE K. SWINBURNE of New York: This has been a very interesting afternoon to me, and I shall not discuss the papers. They have borne out everything that we had demonstrated before — the fact that an early anterior gonorrhœa gives a negative, that cases which are clinically cured may prove to have a positive blood, some of these cases becoming even without treatment, negative a few months later. But the test in making diagnoses has been of great value.

There were three cases that I had this year, of prolonged anterior gonorrhœa. One of these I have very well in mind; the other two I do not remember so well. A boy was treated from the last of April to the first of September, and during that time I did not detect any posterior urethritis. He did have a peri-urethral abscess, which was opened. At the end of his treatment, when I felt that he was clinically well, having put him through the various tests, I took his blood in November and it was negative. Now in all my cases of primary gonorrhœa, after they are clinically cured I try to have their blood tested.

I had a case that recently came to me as a candidate for matrimony. He was a man over forty, a widower; was married a very short time, and had not married afterwards. He contracted a gonorrhœa some fourteen years ago. He had had a bad prostatitis, and six years ago I operated on his stricture, which was a fibrous band and so tight that it could not be dilated by any means. An internal urethrotomy cured it, because today he has no signs of it. But he has had during all these fourteen years a marked purulent discharge, and it has not varied very much at any time. I treated him a few years back after I had cut his stricture, treating his prostate for a long time, but it made no particular difference in the discharge, and I told him at that time he might just as well stop treatment or seek elsewhere. His blood was taken and it was strongly positive — a case of fourteen years' standing.

Two of the strains here in New York have died out. Dr. Schwartz and Dr. McNeil, I understand, are working with only ten strains. Dr. McNeil has promised as soon as he can find time, to hunt up the missing strains or hunt up new ones, because it is a question whether we may not have some other strains.

I have one case now, a candidate for matrimony, who has no discharge as long as he is under treatment, but three days after treatment is stopped he will have a discharge containing gonococci. He has some prostatitis, but his physician thought that his disease had not gone back of the cut-off. Nevertheless the blood gave us an absolutely negative reaction. I had it taken twice. And yet I am inclined to think that this is one case, and it is the only case in all those I have seen, where I felt sure that the man had a gonorrhœa and the blood test was negative, except in some cases where the antigen was bad. There were four other cases where the blood was taken at that time, and two of them were positive, two of them being negative, this being one of them.

There is one other point in getting a negative reaction. I have a case that has been under my care for a year trying to get well, and he is on the last thing that I do, the treatment of the verumontanum. The blood has gradually become less and less positive, until at the last test it was negative, but by absorbing the amboceptor, or something of that kind, a point that I do not understand, the blood can be proved to be faintly positive. It is a point that is found in the Wasserman reaction, as I understand, and also in these cases.

As an illustration of the value of the test in diagnosis, a young woman came to me four weeks ago with a swollen knee. She gave a history of syphilis and gonorrhœa four years ago. Ordinarily I would have said that she had a gonorrhœal joint. I had a Noguchi and a gonorrhœal test made. The gonorrhœal test was negative, the Noguchi positive. She was put on mixed treatment, and I saw her the other day and in two weeks' time the knee had come down to normal and she was perfectly comfortable.

DR. J. L. BOEHM of St. Louis: Almost a year ago I had the privilege of working with and watching Dr. Schwartz at Cornell, and I went home thoroughly imbued with the idea that modern urology cannot be practiced unless a man is equipped with a laboratory, or works in conjunction with some good laboratory, no more than you can practice it without using a microscope. We have been doing this work for almost a year in connection with the Wasserman. We cannot report anything exceptionally interesting outside of what has been reported by the three excellent papers read. This question is probably of as much interest to the orthopedist as to the urologist. There are many cases of bursitis, many cases of so-called sacro-iliac disease, chronic

sciatica and allied conditions in which you will make this complement fixation test and find it to be positive.

A recent case somewhat in line with the one mentioned by Dr. Swinburne came under my observation. A month ago a gentleman whom I had seen several years before with a gonorrhœal prostatitis, came to me. He wanted to get married. The question is put up to you, "Doctor, what am I going to do?" The answer to this gentleman, who is highly intelligent, was: "Here you have the methods of advanced science. You are intelligent enough to understand that according to these teachings there is some latent infection in you. It is up to you to do what you want." I have been at a loss just what to advise. The other day in talking to one of the gentlmen from Chicago my attention was called to the fact that we do not include examinations of the semen, and I must confess in this case we did not, and that should not be overlooked. But too much stress cannot be laid on the fact that it is absolutely mandatory on everyone professing to practice modern urology to use this test, just as much as he would think of using the microscope.

DR. GARDNER: I would like to ask Dr. Swinburne whether in his case that he tested and found negative, he found the Neisser diplococcus.

Dr. Swinburne: Yes.

Dr. Gardner: In our own case in which we found a negative reaction Dr. Clowes reported that a hæmolysis greater than that of normal controls was exhibited in both the syphilitic and gonorrhœal tests. It may, however, be said that we can readily recognize this type of reaction, owing to its occurrence with or without antigens. That was only one out of our one hundred and eighty-five cases, and with only one the percentage was very small.

I would like to disagree with what has been said about the inability to find this reaction in anterior urethritis. It is not found if you examine under three weeks. But I think you get the anti-bodies if you examine after three weeks, although your case may run along and you may feel it is cured within that time. If you follow your blood along you will find that when your man is apparently cured you get a one-plus reaction, a sort of hang-over. I think the trouble with these cases is that they are mild, they clean up very quickly and disappear and we do not get after them. In one of our cases the man was very much upset and very anxious, and it was a question whether he had gonorrhœa or not, and although we found two netatives,

yet when he was practically cured the blood reaction showed a one-plus, which confirmed in our mind that he had an acute gonorrhœa. I think this has been the way, that the blood reaction in the acute cases has been missed because they were apparently cured and were not followed up.

DR. GRADWOHL: As to the absence of the reaction in acute anterior urethritis, it seems to me plausible that unless there is some complication in the shape of a deep follicular infection, I cannot see clearly from a theoretical standpoint how antbodies could form. It has not been my experience to find positives in those cases. So far as a one-plus positive is concerned in either syphilis or gonorrhœa, I do not think any serologist should consider it as positive at all. It is a matter of curiosity rather than of diagnostic importance. I have seen in control work from apparently normal patients in syphilis work an absolute hemolysis from a specimen examined one day, and on the following day a one-plus from the same blood. There is no doubt but what some normal bloods if taken at the proper time will show perfect hemolysis; under some conditions about which we are absolutely in the dark anti-complementary bodies are formed which may give a one-plus reaction. Concerning the explanation of the presence of anti-complementary bodies in the blood we know nothing. Whether they are due to bacterial contamination or exposure to atmospheric conditions, no one has been able to state.

DR. LOUIS L. TEN BROECK of La Porte, Ind.: One suggestion in regard to the discrepancy in the findings concerning antibodies (or compliment fixation) in anterior gonorrhœal urethritis. Certain clinicians (Murphy,[1] Hoffman,[2] and others) have pointed out that the degree of general systemic involvement, due to a localized infection, is in part limited by the nature of the tissue involved in the local septic process. Thus in infections of the biliary tract there is little systemic reaction in those septic processes confined to the gall bladder but considerable constitutional disturbances in those involving the ducts, due to the relative rich lymphatic supply of the latter, which lymphatics readily invite septic absorption. The same relatively rapid absorption is observed where columnar epithelium is involved. It is not illogical to state that the promptness with which and the degree to which anti-bodies are formed depends in part, at least, upon the readiness of septic absorption, and in such tissues as the anterior urethra where there is

[1] Murphy, J. B.: Medical News 1903, LXXXVII, 831, 832.

[2] Hoffman: Nothnagel's Encyclopedia of Practical Medicine (American Edition). Diseases of Bronchi, Plura and Lungs, page 94.

little absorption one would expect a weak and uncertain production of anti-bodies. I believe it is not amiss to insert a word of caution as to the interpretation of negative findings in compliment fixation where such tissues as line the anterior urethra are involved.

Hoffman has carried this analysis farther in a statement [1] based on observations of infections of the respiratory passages, to wit: That an infection of the mucous surfaces, while tending to spread, will travel in all directions over mucous surfaces subtended by tissues of homologous histological structure, but when that line which marks a change in the histological structure of the mucosa or submucosa is reached there is a very noticeable tendency for the infection not to pass over to the other side. This in spite of the fact that the same serum and leucocytes are to be found on either side of this histological barrier. Were the processes of immunity confined to these two tissue elements alone it would be difficult to explain this well-founded observation of Hoffman. It is likewise difficult to avoid giving some place in immunizing processes to the individual cells (apart from the leucocytes) comprising a mucous membrane. If such hypothesis is correct there must be means of combating an infection independent of those heretofore in vogue. For the past four years I have tried the efficiency of anti-streptococcus serum (inert as usually given) applied alone to the pharyngeal mucous membrane, the seat of streptococcus infection refractory to all other measures, with very satisfactory results. Recently before the New York Academy of Medicine, Dr. Matthias Nicoll [2] expressed similar views regarding anti-streptococcus serum in scarlet fever similarly applied. I have also tried to introduce artificial phagocytosis using thallophytic fungi (saphrolignati) for this purpose with very encouraging success. These are mere suggestions, that a mucous membrane of peculiar structure in addition to affording difficulties such as are reported in compliment fixation will in some instances provoke disappointment when we attempt to rely solely upon the means ordinarily invoked for immunizing the same. I refer especially to vaccines, for tissues which limit septic absorption must of necessity receive a realtively low supply of anti-bodies.

---

[1] Hoffman: loc. cit. page 575.

[2] Dr. Matthias Nicoll: Joint meeting Philadelphia Pediatric Society and New England Pediatric Society and New York Academy Medicine, Nov. 9, 1911.

We do know that such observers as Billings[1] have reported tardy or incomplete results among many brilliant ones in the use of modern immunizing measures. At least this hypothesis affords a satisfactory explanation of why compliment fixation in an anterior infection is relatively delayed and, at least in the early stages, less reliable, and affords a very safe viewpoint along with others from which to interpret our results. There are other pathological problems which become clearer when viewed in this light; for example, the diverse clinical and pathological appearances that are provoked in bacterial invasion of the skin by one and the same organism, also in the so-called sympathetic inflammations of the opthomologist; but it is not the scope of the discussion to do anything more than to point out its application to the subject before the house, and to indicate its importance

[1] Billings: Am. Journ. Med. Sci., May, 1910. New York State Journ. Med., May, 1910.

SIGMOIDO-VESICAL FISTULA: REPORT OF TWO CASES.

JOSEPH L. BOEHM AND JOHN McH. DEAN
ST. LOUIS, MO.

The study of sigmoid diverticula and their complications as a pathological entity has thrown new light on some morbid conditions of the bladder that formerly were not entirely understood. Diverticulitis of the sigmoid flexure is a condition that is merely alluded to in some text books on surgery and proctology and in many not referred to at all. Until 1898 reports of such a condition in medical literature are very meagre. Maxwell Telling of Leeds, England, in that year collected all cases reported to that date, and for the first time summarized them. English literature was without any clear description of this condition until then. His summary has served as a basis for most of the contributions to date, and to which we acknowledge our indebtedness.

Diverticula may exist congenitally or acquired, in various parts of the large intestine. They are merely hernial protrusions of the coats of the bowels of various sizes. They are most common in the sigmoid flexure and here attain the largest size.

On account of the proximity of the rectum and sigmoid flexure of the colon to the bladder and urethra, we as urologists are particularly interested in this pathological condition by reason of the fact that secondary bladder disease and complications very shortly follow such a primary sigmoidal condition.

Not all sigmoid diverticula cause complications with other viscera, but the formation of adhesions

between the sigmoid loop and the bladder is very common. Later a fistulous communication between the bowel and bladder occurs. According to Telling in his classic article (The Proctologist, Vol. 5, No. 1) such a condition is frequently mistaken for carcinoma. He says: —

"The diverticula themselves are buried in a mass of hardened fibrous tissue which very frequently gives rise to secondary adhesions to adjacent viscera. This leads to one of the most important results — the mimicry of carcinoma. It is not surprising that the surgeon, when he opens the abdomen and sees such a tumor of the sigmoid loop, should regard it as carcinoma, considering the relative frequency of malignant disease in this region. In the past the tumor has been dealt with under this mistaken diagnosis. Such specimens have been found on museum shelves labeled 'carcinoma.' If not labeled carcinoma they are put up as 'simple inflammatory stenosis.' In the majority of cases of peridiverticulitis, ulceration of the mucous surface of the gut does not occur. But perhaps one of the greatest revelations which the study of these diverticula has made lies in the further light which is thrown upon our knowledge of vesico-sigmoid fistula. From the anatomical disposition of the parts it is obvious that adhesion between a peridiverticulitis and the bladder will be likely to occur. When it is remembered that such adhesion occurs at the end of a pouch which has fecal contents, and which pouch may at any time become perforated and give rise to a suppurative process between the inflammatory sigmoid mass and the bladder-wall, it is not surprising that a fistulous communication between the two viscera should occasionally result. The fistulous communication is often a narrow and tortuous tract which tunnels through a considerable thickness of inflammatory fibrous tissue. In 1908 I could only place on record eleven such cases. One of these,

which I recorded for the first time, I discovered on the shelves of the musuem of Guy's Hospital, the diverticular origin not having been recognized. The fibrous tissue intervening between the bladder and bowel wall was some two inches thick. Clinically, the age of the patient has a great bearing on the diagnosis and one would hesitate very much in making a diagnosis of diverticulitis in a patient under forty years of age, though Fiedler has described a well marked case at twenty-two, and diverticula with secondary inflammation have been noticed in one instance at the age of five."[1]

Most surgeons maintain that vesico-sigmoid fistula is the result of malignant disease. As a result of the study of diverticulitis cases we now know that this is not always the case. Adhesions between the bladder and sigmoid or small intestine may result also from ulcerations, either tubercular or syphilitic in origin, becoming extensive and a fistulous communication forming between them. Entero-vesical and recto-vesical fistulæ may result from trauma, bullet wounds, foreign substances in the bowel, stone in the bladder, and from destructive inflammatory processes, such as fecal matter collecting in diverticula, forming in the walls of the sigmoid or colon. Tuttle reports eighty-nine cases of bladder fistula communicating with the rectum. He says: "A fact which should be remembered is that while a stone may exist in the bladder in these cases, it is not necessarily the cause of fistula, but many be the result of same through some of the fecal contents escaping into the organ and thus forming a nucleus around which the stone forms."

Cripps has collected sixty-three cases of entero-vesical fistula, in which the intestinal opening was in fifteen cases into the sigmoid flexure.

---

[1] Ashurst: Annals of Surgery, Vol. XLVII.

Moynihan calls attention to the frequency of the diverticular origin of vesico-colic fistula. He says: "The formation of a vesico-intestinal fistula seems to be one of the tendencies of perforated false diverticulum; a search through the literature has shown that it is far more common than was supposed. In cases where a hard growth in the intestine is accompanied by the passage of flatus and feces by the urethra, a diagnosis of carcinoma seems to be irresistable, yet the probability is 'that the growth' would be simple, and that the cause of the fistula would be a false diverticulum which had burrowed its way through all the coats of the bowel, and thence through the wall of the bladder which had become adherent."

The cardinal point in diagnosis of all vesico-intestinal fistulæ is the presence of gas and fecal matter in the bladder and urine. Whether urine escapes into the bowel or not depends entirely on the location of the fistulous opening in the bladder. In our case there was apparently no escape of urine into the rectum, nor was there any marked degree of proctitis shown by proctoscopic examination, because the opening into the bladder was at the extreme left side of the fundus. The bladder, on account of such severe cystitis, did not retain any quantity of urine for any considerable time; the desire to urinate was almost constant, and hence the viscus was never completely filled. The case, which we report as follows, is of interest.

Miss B. K., age forty. Family history negative; father died at age of eighty-one, mother at forty-eight with anasarca. She has four brothers living and three sisters, all in good health. One sister died of pulmonary tuberculosis at thirty-three; was a graduate nurse and probably contracted the disease while performing her duties. She had none of the diseases of childhood, but was a very puny infant.

Menstruation began at the age of ten and was always regular. She had worked hard from childhood and thinks her trouble dated back to the age of sixteen, when she claims that she helped her father in some construction work on a house, and while chopping off the mortar from bricks with a hatchet, she bruised her left side with several of the bricks. She has done housework for some years and has suffered with obstinate constipation for years.

In August, 1910, the patient consulted her physician, Dr. J. A. Hartmann of St. Louis, who later referred the case to the writers. For two years previous to this time she complained of pain in the left lumbar region and had passed blood from the bowels at times, attributing this to hemorrhoids. Soon after this she noticed some pus passing with her stool. Pain was never constant. Since passing pus from the bowels she has had more distress in the lumbar region. Three weeks preceding her first visit to Dr. Hartmann she passed about a pint of blood from her urethra. This was about a week after menstruation had ceased. From that time on the pains have been constant and severe, and excruciating when the bowels moved, especially in the bladder and urethra. She took frequent laxatives, as magnesium sulphate and citrate. These would increase the urethral pain on urination. (We believe her urethral pain was due to the irritation of fecal matter passing out with the urine.) One week before consulting Dr. Hartmann, she ate some grapes and passed the seeds, as she said, "through the vagina." Her weight was not apparently influenced by her sickness, until her confinement in the hosiptal, when she began to rapidly fail.

Status Præsens. — Large, healthy looking woman, well nourished, color good. Frequent desire to urinate, with no relief after micturition. Passes an

ounce or less each time and at least three times each night must micturate. Feels as if bowels want to move very frequently. Straining at stool constantly, she says she feels as if some obstruction is near the anus. She passes fecal matter per urethram, molded in a shape conforming to urethra. Severe pains radiating to lumbar region, starting in left iliac fossa, and also down the thigh to the knee. One of these attacks in which we saw here was like a renal colic. Palpation of abdomen showed a firm non-movable mass in the left lower quadrant. Vaginal examination showed this mass to completely fill the left side of the pelvis, which was about as large as a good sized orange, firmly attached to the uterus and bladder. Hot and local applications gave no relief. Eating of foods rich in cellulose, such as beans, etc., produced more distress.

Vaginal examination showed a rectocele and vesicocele; no fistulous communication between the vagina and bladder or bowel. Bladder catheterized showed thick purulent urine mixed with fecal matter. After washing bladder a long time we succeeded in getting a return flow fairly clear and then cystoscoped, showing a most severe cystitis diffused throughout the bladder, with large areas of denudations of mucosa. In the extreme upper left angle of the fundus we noticed a dark area, which we thought to be a pocket, and on moving the cystoscope up near it we observed that the beak of the instrument entered this space.

Realizing that we had a hole in the bladder wall an assistant was asked to insert a rectal tube and inject methylene blue solution into the bowel, which showed that the blue solution quickly trickled into the bladder. Our diagnosis then was complete, of fistula communicating with the bowel.

Patient was operated on in a few days. Abdominal section disclosed adhesion between the sigmoid

flexure, left fallopian tube and bladder. A large sinus existed between the bladder and sigmoid, through which the tip of the little finger would pass, and fecal matter was escaping into bladder. The sinus was resected by removing the sigmoid and portion of the bladder. The upper end of the colon was united to the rectum. The opening of the bladder was difficult to close on account of the wall being so indurated. The defect in the bladder was closed by suturing the fundus of uterus to the bladder. Bladder was drained by catheter.

Patient succumbed to peritonitis three days after operation. Section of removed mass shows sigmoid much thickened; mucosa normal; submucosa and muscularis, enormously enlarged. In submucosa we find adenocarcinoma. Bladder mucosa and wall show degenerated nuclei, which do not take up stain. The specimen is one of bladder carcinoma with adhesion to the sigmoid.

J. R. Pennington [1] reports a case in a male, age forty-three, of carcinoma involving the upper part of the rectum and sigmoid flexure. Laparotomy showed the posterior wall of the bladder was involved. An inguinal colostomy was done. Patient passed gas and fecal matter from the bladder, and tried to urinate every few minutes. A suprapubic cystotomy thirty-six hours after the colostomy showed the bladder to be a carcinomatous mass, filled with feces and urine. He died six weeks after operation.

Wilson [2] summarizes fifteen cases of diverticula of of the lower bowel studied at the Mayo clinic to December, 1910. In cases of peridiverticulitis he finds that the inflammation does not involve the mucosa of the bowel.

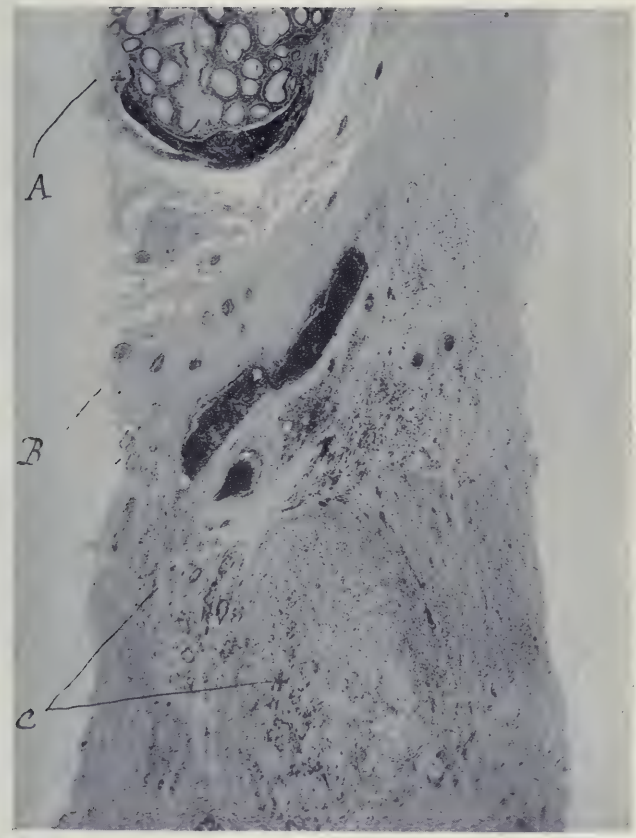
---

[1] Protologist, Vol. II, No. 3, 1908.

[2] Annals of Surgery, Feb., 1911.

S = Sigmoid.

B = Bladder.



A = Mucosa.

B = Necrotic submucosa.

C = Showing cancer in muscular layer.

Griffin[1] reports a case in the Mayo clinic of a male, forty-eight years old, with rectal diverticulitis, who noticed blood in the bowel movements seven months previously. Patient lost rapidly in strength and eleven pounds in weight. Tumor extended four inches above the anus, up to the lower sigmoid, as shown by operation. The seminal vesicles were involved and had to be removed. He calls attention to the possibility of mistaking diverticulitis of the rectum for syhpilitic and inflammatory stricture.

W. J. Mayo[2] reports a case that was seen by him in 1896, with a fecal fistula into the bladder; evacuation of pus, gas and feces into the bladder. Diagnosis was made of probable appendicial abscess with secondary intestinal fistula. Abdominal section revealed a vesico-sigmoidal fistula. A combined urinary and fecal fistula to the surface was the result.

Souther[3] reports a case in a male, age fifty-seven. Had syphilis thirty years previously. Had irritable bladder for some time and later passed gas through the urethra. When seen by Dr. Souther in August, 1909, gas and particles of feces were passed from the urethra. Patient lost weight and had frequent and painful vesical tenesmus. Physical examination showed an easily palpable tumor above the left Poupart's ligament, which seemed to be fixed to the bladder region and could not be moved. Abdomen distended and tympanitic. Constipation existed almost to obstruction of the bowels. Urination took place every twenty minutes, day and night. Gas was passed with each effort to urinate. Septic temperature and chills.

Cystoscopic examination was unsatisfactory on account of inability to fill the bladder, as the water would run out of same. No information as to the

[1] Annals of Surgery, April, 1911.
[2] Surgery, Gynecology and Obstetrics, July, 1907.
[3] The Lancet Clinic, Vol. CVI, No. 20.

location of the fistula was gained. The coil of the sigmoid as revealed by laparotomy, was intimately blended with the peritoneum of the lateral wall of the bladder and pelvis. Complete removal seemed inadvisable and probably impossible. A lateral anastomosis was decided upon. Diagnosis was between gumma and carcinoma.

A second case, under observation of one of the writers, is that of a male, aged eighty-four, retired merchant. Examination February 8, 1912, showed patient to be fairly rugged for his age. Prostate by rectal palpation felt atrophied but nodulated, and higher up a mass in the wall of rectum was distinctly felt. Capacity of bladder was fifteen ounces; bladder seemed to be anesthetic, as marked distension with fluids did not seem to pain patient. For some months previous to coming under our observation patient urinated frequently during day and night, and in the last few weeks finds it impossible to evacuate bladder without a catheter. Bladder badly infected and much pain when he strains at stool. No gas was seen to pass from urethra at first examination. Cystoscopy showed an apparent atrophied bladder mucosa, no rugæ, no evidence of prostatic enlargement intravesically. Marked cystitis shown by ulcerated areas. A sacculation of left side of bladder wall was plainly seen.

Two weeks after patient entered hospital he began passing gas and fecal matter from the bladder when catheterized, with great pain on introduction of the catheter each time, and an obstruction in the region of the prostate was encountered, due, as we believe, to the breaking down of a malignant mass. Abdomen was very much distended, the abdominal wall was very thin and there was a large mass, in which the bladder was included, reaching from the pubic bone almost to the umbilicus, which was a doughy consistence, painful to manipulation. A diagnosis of entero-

vesical fistula was made and suprapubic cystotomy for drainage advised. This was refused by the family, because no permanent cure or positive assurance of any benefit was promised. Patient died of sepsis and myocarditis on March 21. Autopsy showed a bladder wall about as thick as heavy wrapping paper, dense adhesions surrounding the whole bladder, which was connected in a mass to the sigmoid and rectum. A carcinomatous mass existed on the posterior wall and on the left side of the viscus an opening into the bowel was found, through which one finger readily passed. The whole mucosa showed a hemorrhagic cystitis. In this case when the rectal tube was passed for irrigation of the bowel a mass was encountered in the rectum which acted as an obstacle to the thorough evacuation of the gut. This patient gave a history of chronic constipation.

Summary.

What may appear as primary carcinoma of the bladder is at times secondary bladder involvement due to malignant changes occurring in an intestinal diverticulitis.

The intestinal mucosa may not show histologically malignant changes even when the carcinoma is primary in the walls of the bowel and extends into the bladder secondarily.

Close observation of the rectum and sigmoid flexure is mandatory as well as a study of the male pelvis in suspicious cases of cancer of the bladder other than prostatic cancer.

Early recognition of diverticula and peridiverticulitis of the lower large gut will when surgically treated abort and ultimate in entero-vesical fistula.

It is probable that many cases of cancer of the prostate are due to extension from such malignant changes in a rectal diverticulitis low down in the wall of the gut.

BIBLIOGRAPHY.

Sigmoiditis and Perisigmoiditis. Maurice Patel. Reveu de Chirurgie, October and December, 1907.

Acquired Diverticula of the Sigmoid Flexure. W. H. Maxwell Telling. The Lancet, London, March 21 and 28, 1908.

Cancer of Rectum; Comparative Results of Operative Procedures. J. Rawson Pennington. The Proctologist, Vol. II, p. 167.

Treatment of Fistula between Intestine and Bladder by Exclusion of Former. W. Sachs. Deut. Zeit. f. Chir., Dec., 1909.

Diverticula of the Lower Bowel; their Development and Relationship to Carcinoma. L. B. Wilson. Annals of Surgery, Feb., 1911.

Diseases of Anus, Rectum and Colon. Tuttle. p. 440.

Diseases of Rectum and Anus. Harrison Cripps. 3d Edition, p. 520.

The Surgery of the Rectum. Kelsey. 6th Edition, p. 172.

Earle's Diseases of Anus, Rectum and Sigmoid, p. 230.

Sigmoido-vesical Fistula; Lateral Anastomosis; Operation; Recovery. Charles T. Souther. The Lancet-Clinic, November 11, 1911.

Acquired Diverticulitis of the Large Intestine. Wm. J. Mayo. Surgery, Gynecology and Obstetrics, July, 1907.

Diverticulitis of Rectum. Giffin. Annals of Surgery, April, 1911.

A Case of Carcinoma on Diverticulitis of the Sigmoid. Giffin and Wilson. Amer. Jour. of Medical Sciences, Nov., 1909.

The Clinical Aspects and Importance of Sigmoid Diverticula. W. H. Maxwell Telling. Proctologist, March, 1911.

ILEO-VESICAL AND APPENDICO-VESICAL FISTULÆ COMPLICATED BY STONE IN THE BLADDER.

PAUL M. PILCHER,
BROOKLYN, N. Y.

The patient, a gentleman thirty years of age, consulted Dr. A. T. Bristow in December, 1903. Four years previously he had an attack of appendicitis, of grave moment. The attack at that time was considered to be one of renal colic. Ten months after this the patient began to pass small quantities of blood in his urine, with occasional attacks of vesical spasm. One month later he began to pass bubbles of gas with his urine, invariably with the morning urination. One month later, had a pain in the right hypochondrium, which was interpreted as ureteral colic, and he passed two substances from his bladder resembling lumbricoid worms in shape, which were supposed to be ureteral casts. They were decolorized blood clots. The patient improved with bladder irrigation. Blood and pus disappeared and the pneumaturia had ceased. He gained twelve pounds in weight. On examination with a searcher a small stone about the size of a chestnut was discovered, but this did not explain the ureteral casts or the pneumaturia. No gas-producing bacilli could be demonstrated. Cystoscopy was done by the late Dr. Tilden Brown, but nothing abnormal could be discovered in the bladder wall, the small stone being seen on the base of the bladder. There was no cystitis. An X-ray demonstrated the right kidney and ureter to be normal.

A suprapubic operation was done by Dr. Bristow, and the stone removed. The bladder was examined but no indication of a fistulous opening was discovered. Bladder wound closed, primary union.

Six months later, the pneumaturia returned for forty-eight hours, then ceased. Two months later it recurred. That was followed by numerous irregular recurrencies at regular intervals. On September 4, 1905, he had a very severe attack of pain in the right iliac region. On the third day pain ceased and was referred to the bladder. His urine was stringy with pus and soon blood appeared. This was evidently an acute attack of appendicitis, with rupture into the bladder. The pneumaturia recurred. In November, 1905, the late Dr. Tilden Brown catheterized both ureters, and colon bacilli were demonstrated in all of the specimens.

In January, 1906, he had another severe attack of pain in the right side, with chills and high fever. This illness lasted ten days. The patient passed some gas again. In May, 1906, after severe physical exercise he passed gas in quantities but without pain. In June, 1906, passed a quantity of blood and pus in his urnie, but there was no pneumaturia. On January 29, 1907, he had another attack of inflammation in the lower abdomen, with an increase in the amount of pus mixed with the urine. The urine was clear in the daytime, but thick with pus every morning, and the urine contained vegetable fibers, showing that there was some communication between the intestine and the genito-urinary tract. Then a fecal fistula was established without question, and was shown by means of a cystoscope to be one inch above the right ureter opening. At first the materials would take five or six hours to appear in the urine. *There was at no time any cystitis, as demonstrated by the cystoscope on three occasions.*

Two years ago the patient presented himself, passing gas per urethram regularly. Food which would be taken would be passed in part per urethram fifteen minutes after its ingestion. Considering the history, a diagnosis was made of a previous suppurative appendix attached to the bladder, rupture of the appendical abscess into the bladder, and the establishment of an incomplete appendico-vesical fistula at first, which later became dilated through usage, and the establishment of a free communication between the cecum and the intestine.

An operation was done by Dr. A. T. Bristow and the writer. An abdominal section revealed the appendix attached directly at a point in the bladder opposite to where the fistulous tract opened into it. The appendix passed directly across the pelvis from the cecum to the bladder. The appendix was ligated at the cecal end and again at the vesical end, each stump being everted. A probe passed through the appendix demonstrated it to be freely open throughout its entire extent. We felt that we had accomplished a closure of the fistula. Four days after the operation the patient developed a paralytic ileus with extreme retrograde peristalsis and dilatation of the stomach, accompanied by violent fecal vomiting and abdominal distension. So great was the calamity that the abdominal wound was torn open. Under appropriate treatment the patient recovered with a ventral hernia. As soon as the normal peristalsis became re-established it was found that gas was again present with the urine, and within two weeks after the operation, fecal matter was again found in the urine.

For two years the condition persisted and became worse. Twelve minutes after eating grape fruit, undigested portions of pulp would be passed per urethram, also small pieces of olive or other hard substances would be passed per urethram twelve or thirteen minutes

after ingestion. Cystoscopy in connection with an X-ray examination revealed the presence of an ileo-vesical fistula near the lower end of the ileum. The X-ray showed that the patient emptied his stomach of a full bismuth-buttermilk meal in fifteen minutes, which is not at all abnormal.

A second operation was undertaken. The ileo-vesical fistula was easily demonstrated and a purse-string suture passed through the bladder wall around the opening and tied. The intestine was cut loose from the bladder and showed clean-cut intestinal edges without any round-celled infiltration or induration. The fistulous opening was in the lateral wall of the intestine about one-half an inch in diameter and was easily repaired. The vesical portion of the fistula was inverted with a second tier of chromic gut sutures, and an omental flap was sutured over the opening. A drain was inserted down to the omental flap. Three days after the operation complete paretic obstruction recurred, with fecal vomiting, which was controlled by the injection into the vein of forty c.c. of warmed hormonal — normal peristalsis being re-established by this means within four hours. The patient has made good recovery, and was demonstrated to some of the members of this Association when they visited my clinic.

MICROSCOPICAL URINALYSIS AS AN AID TO DIAGNOSIS OF DISEASES OF THE URINARY TRACT.

LOUIS HEITZMANN,
NEW YORK.

In a short paper like the present one, it is not possible to do more than call attention to the great aid which can be obtained in the diagnosis of diseases of the urinary tract by a thorough microscopical examination of the urine. For the purpose of estimating the renal function, many different methods have come into use, yet not one of them gives satisfactory results in the hands of different observers, as we have again heard in the discussion of the papers on the value of phenosulphonephthalein.

It is unfortunate that even today so little value is placed upon a thorough microscopical urinalyis, which is confined practically to the examination for the presence or absence of tube-casts, and even in this mistakes are constantly made. As long as a urinary sediment is rapidly examined with a low magnifying power only, so long the examination will remain of little value. As soon as higher magnifying powers, about five hundred diameters, are generally used in urine work, and attention paid to all the features present, and not alone to casts, it will be found that microscopical urinalysis can clear up many doubtful cases.

It is constantly claimed that the epithelia present in urine are of no use whatever for the location of a pathological lesion in the urinary tract, since scrap-

ings from the different organs do not show that the epithelia are essentially different from each other. This stands to reason, since such scrapings are bound to change the character of these delicate formations. An entirely different opinion will be formed when the epithelia are studied in the organ itself, especially when sections are mounted in chemically pure glycerine, instead of Canada balsam, where a shrinkage is bound to take place. Under these conditions it will be found that the epithelia lining the different urinary organs are decidedly different, those from the uriniferous tubules being much smaller than those from the pelvis of the kidney, or even the ureter, not to speak of those lining the bladder or the sexual organs.

If we now examine separate urines taken by means of the ureteral catheter, where the admixture of epithelia from the lower tract can be excluded, and in which we clinically can diagnose the presence of a pyelonephritis and ureteritis and compare these with the epithelia as seen in the organs *in situ*, correct opinions can soon be formed as to the location of these formations. The epithelia found in the urine in cases of pure cystitis are entirely different from those found in ureteral catheter urines. It would of course be folly to suppose that every single epithelium can be located exactly, since there are bound to be some which must remain doubtful, on account of certain changes taking place through the inhibition of the watery constituent, some epithelia swelling more than others, especially in low specific gravity urines. The largest numbers of epithelia, however, are decidedly distinctive, and can be positively located.

To arrive at any conclusions which are to be of practical value, we must know the histological structure of the organs as well as the pathological changes occurring in different lesions. Then and only then will we be able to form positive conclusions not only

of the location, but also the character and even extent of the lesion. Again, it cannot be sufficient to examine microscopically alone, but chemical examination of every urine is necessary in conjunction with the microscopy. In kidney lesions, in which the question as to the functional efficiency of one kidney is important, chemical and microscopical examination of the separate urines, obtained by the ureteral catheter, frequently enough allows us to form a better opinion of the renal function than tests carried out with the cryoscope, methylene blue, phloridzin, phenosulphonephthalien or by any other test so far devised.

In every pathological lesion of the urinary organs, be it a simple inflammation, a suppuration, an ulceration, a hemorrhage or even a mere congestion, pathological products of the lesion are bound to show in the urine. These will be in the form of pus corpuscles or leucocytes, red blood corpuscles and desquamated epithelia from the organ in which the pathological process is located. In inflammations of the kidney tube casts may or may not be present, but these latter are by no means essential for the diagnosis of a kidney lesion. In a number of even severe kidney lesions, such as cirrhosis of the kidney or suppurative nephritis, true tube casts need not at any time be present in the urine. In such cases a correct diagnosis is as a rule not made, and many a case shows the presence of a destructive process in the kidney at the autopsy table, in which a correct diagnosis has not been made during life, simply because tube casts were never found in the urine. A case of cirrhosis or sclerosis of the kidney, for instance, need never show casts in the urine, and in many of these cases even the amount of albumin may at all times be not more than a mere trace, or at times so minute as to be entirely overlooked with the generally used albumin

tests. It is here, especially, that the knowledge of the pathological changes occurring in the organ, together with our ability to diagnose the epithelia seen in the urine, is of the utmost importance in arriving at a correct conclusion.

The uriniferous tubules are lined by a simple layer of epithelia, which vary in the different portions of the tubules, being partly flat, partly cuboidal and partly columnar. These epithelia are always small, the flat and cuboidal being very similar in urine, while the columnar are always distinctive, being the smallest cylindrical formations seen in urine. These epithelia may be found lying upon true tube casts when the latter are present, but desquamate in every pathological lesion of the kidney, whether casts are present or not. They will therefore always be present in the urine in varying numbers, in all cases in which there is a diseased condition of the kidney, no matter how slight or how severe The same holds good for all pathological lesions of the pelvis of the kidney, the ureter and the bladder, as well as in many lesions of the sexual organs, especially the prostate gland and the seminal vesicles.

In cases of suppuration of any of the organs mentioned, a destruction of tissue is invariably present. In such cases there will be red blood corpuscles, pus corpuscles and desquamated epithelia in the urine, the two latter frequently in large numbers, together with a certain amount of connective tissue, in the form of moderately refractive, irregular, waivy shreds of varying sizes, entirely different in appearance from the mucous-threads which are more or less present in every urine. The presence of connective tissue in large amount means the presence of some destructive process, while the desquamated epithelia allow us to locate that process. In a cirrhosis of the kidney where new connective tissue has formed

as a result of proliferation, small shreds are also present, as a rule even when no casts are found. A diagnosis of renal cirrhosis can be made in practically every case from a combined chemical and microscopical urine examination, provided we know what changes occur in the kidney lesion and provided we know what features must be present in the urine in such a case.

As soon as more attention is paid to thorough urinalyses, as soon as we realize that certain features can only be present in certain pathological processes, and as soon as we disabuse our minds of the incorrect idea that no epithelia can be positively diagnosed in the urine, and realize that a thorough urinary examination amounts to very much more than a mere search for casts, just so soon will we be able to aid our patients and ourselves by a urine examination to a degree considered impossible by the majority of physicians at the present day.

DISCUSSION

OF PAPER OF DR. HEITZMANN.

DR. BURTON HARRIS of Brooklyn: It is now six years since I had the good fortune to study in Prof. Heitzmann's laboratory, and the ability to differentiate epithelia and to correctly interpret the various other elements which occur in urinary sediment, has been of inestimable value to me. Our case records at the German Hospital show quite conclusively that a microscopic study, not only of the urine passed per urethram, but particularly of the separate urines, is of decided value in determining the location, nature and extent of pathologic changes. I well recall the sympathetic smiles with which our early reports were received, but the work has stood the test of time and my colleagues of the surgical staff now regard it as one of the most reliable of all diagnostic methods. In fact, I am able to recall but few cases in which urinary findings failed to correspond with the conditions found at the operating table or with the final reports of the pathologist.

Professor Heitzmann is too modest to relate an incident which occurred while I was still in his laboratory. A distinguished pathologist who holds the chair in one of our large universities, came to the laboratory and took the prescribed course. Being still somewhat skeptical on completion of the course he submitted, at Professor Heitzmann's suggestion, three specimens of urine from hospital patients of which he had no knowledge. Professor Heitzmann demonstrated the microscopic features of the specimens and diagnosed them respectively as acute suppurative prostatitis, renal tuberculosis and vesical calculus. Subsequent inquiry at the hospital established the correctness of all three diagnoses.

DR. M. LAUTERMAN of Montreal: The first time that I had the pleasure of hearing Dr. Heitzmann bring this subject before the Association was at Boston some seven or eight years ago. I am free to confess that I received his remarks on that occasion very skeptically, and did not pay very much attention to them until two years later, when Dr. Townsend, who is one of his students, demonstrated beyond any doubt to me that this work

was practical. I have since then had occasion to do considerable along these lines myself, and am in a position to confirm from personal experience all that Dr. Heitzmann has said this afternoon. And I also feel that it is due to acknowledge to him the diagnosis in the case of a confrère, who is also a member of this Society, who has had one of the most obscure conditions that I ever had to deal with. His diagnosis was confirmed in every possible sense, and made it possible for me to relieve our confrère's condition without resorting to a serious surgical procedure. I think, however, this is a class of work that one cannot appreciate unless one studies it. It is not beyond any member of this Society's ability; once having acquired a knowledge of the normal epithelia of the different situations of the genito-urinary tract, it becomes quite possible, as Dr. Heitzmann has correctly stated, to diagnose the different lesions that we meet with in these different situations by a microscopic study of the epithelia as found in the urine.

DR. HEITZMANN: I really have nothing further to say, except that I am gratified about the remarks that I have just heard from the two gentlemen, one of them a former student of mine, the other not. Yet they have both told you that there are possibilities, and great possibilities, in microscopical urinary diagnosis. Gentlemen, do not start out with the idea that a diagnosis from microscopical urinary examination alone, is impossible. Start out with the idea that there is a possibility of going further with your analysis under the microscope than the regular examinations as they are usually made, seem to indicate, and you will be fully repaid. Do not, on the other hand, believe that every single epithelium can be diagnosed and that you will not make a mistake. To err is human, and we are all bound to make mistakes, but a conscientious study of the formations found in urine under the microscope will soon convince us of the many possibilities as to diagnosis.

RADIOGRAPHS OF THE BLADDER AND BLADDER NECK.

BENJAMIN S. BARRINGER AND GEO. M. MACKEE,
NEW YORK.

There are two reasons for our attempt to obtain radiographs of the bladder and bladder neck. First, we wished to supplant the cystoscope in the diagnosis of obstruction at the bladder neck caused by either prostatic hypertrophy or contracture. Second, we had hoped to succeed, where the cystoscope fails, in diagnosing contracture of the bladder neck in the pre-residual urine stage, or when it is associated with prostatic hypertrophy.

At present these two conditions can only be diagnosed by digital exploration of the bladder neck at the time of operation. While most of our work has been of negative value, we have been able to differentiate a normal bladder from an obstructed one, but we have not been able to differentiate between the causes of obstruction.

This last statement should perhaps be modified, as one picture has been obtained of an extreme degree of contracture of the bladder neck, from which we believe the diagnosis could be made.

TECHNIC OF RADIOGRAPHY.

Position. In all cases the patient has been flat on his back. An interesting point which our work has brought out is that we believe this position gives a better picture than a lateral position. The reasons for this are: first, the dorsal position gives an excellent

Plate I.

Normal Bladder.

Plate II.

Normal Bladder.

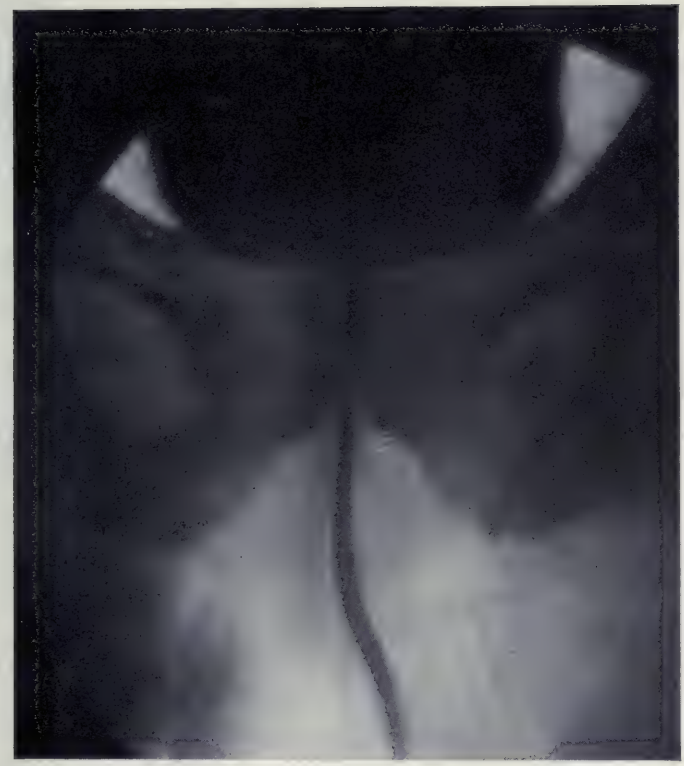


Plate III.

Prostate Hypertrophy.

Plate IV.

Contracture of Bladder Neck.

opportunity to show the bladder neck, the bony symphysis not at all interfering; second, it might be supposed that the lateral position would give a better picture of intravesical prostatic enlargement and especially of the middle lobe. As far as we can judge, no matter what the position, it is impossible to get a picture of the prostatic lobes if the bladder be filled with a medium impervious to the X-ray. The prostatic lobes project into the bladder and are totally surrounded by the solution in the bladder, and therefore do not show in a radiograph.

Method of Injection and Solutions Used.

We have tried an argyrol solution, using forced injection through the urethra into the bladder; the radiographs being taken during injection. Argyrol proved too expensive and more pervious to the X-ray than bismuth. Also, the forced injection was uncomfortable for the patient. We changed to bismuth salts and the subgallate and subnitrate in milk. These were injected into the bladder through a catheter placed from one to one and one-half inch distal to the internal urethral orifice; injecting first about one hundred c.c., and then fifty to one hundred c.c., while the radiograph was being taken. We believe bismuth should not be used if a patient has residual urine. We have also tried to take radiographs after instillation of bismuth lubrichondrium paste, but the pictures so taken were unsatisfactory.

One fact was brought out in these pictures. The lubrichondrium which has the same base as the alypin libricant which we use to anæsthetize the posterior urethra, does stay in the posterior urethra. This accounts for the excellent anæsthetic effect of the alypin lubricant. An interesting point occurred during the washing out of the injection of bismuth which

would suggest the best position for cystoscopy when we have to deal with cleansing a bladder of large amounts of pus excreted from the kidneys. As shown by the pictures of a normal bladder this organ is funnel shaped, the lower end of the funnel ending in the urethra. When the patient was lying down it was impossible to wash out the bismuth emulsion; when he sat up or stood up, in other words when the lower end of the funnel was down, the bismuth could easily be washed out. In the cystoscopic position in which the patient is sitting with the feet resting below the table edge, the lower end of the bladder funnel, the urethra is approximately at the lowest point and the bladder washing is easily accomplished.

The Results. None of the radiographs show good pictures of the prostatic urethra. This has been disappointing, as we particularly wished to show the contracture of the bladder neck. The pictures corroborate the generally accepted idea that the prostatic urethra does not become a part of the bladder proper, by the opening of the bladder sphincter when the bladder is full of fluid. The great distension of the bulbous urethra when forced bladder irrigations are used is well shown in Plate I.

The Normal Bladder. This is funnel-shaped, with a less dense area below the bladder proper, representing the lower portion of the funnel. Plate II.

The Bladder in Prostatic Hypertrophy. All the radiographs show practically the same conformation. The funnel shape of the normal bladder is gone. There is a bilateral bulging of the inferior portions of the bladder. In no cases have we obtained pictures of the prostatic lobes notwithstanding that in a number of cases there was marked intravesical enlargement with varying grades of retention. Plate III is a type of this picture.

Contracture of the Bladder Neck. We have had two unquestioned cases of contractured bladder neck, and one doubtful case. One of these cases of contracture was of extreme degree and shows an interesting radiograph. The examination in this case was as follows:—

Urine heavy with pus; residual urine from four to six ounces (at different times).

Cystoscopic Examination.

The diagnosis of contracture was made because the cystoscopy showed no intravesical prostatic enlargement. (Plate IV shows the bladder neck.) Trigone was irregular and the left ureteral orifice was much distorted in position, and golf-holed. Pus was obtained from both kidneys; a much larger quantity from the left. The function of the left kidney was very much reduced.

The radiograph shows marked distortion of the bladder neck. The picture at first glance would seem to be one of a prostate jutting into the bladder, with the urethra going directly through the centre of the prostate. If, however, this were a prostate the bismuth solution would surround it and we would see nothing. The proper interpretation is that the entire bladder neck has been drawn up as a result of the contraction of inflammatory tissue. The displaced left ureteral orifice seen in the cystoscopic plates of the bladder neck adds to the picture of general distortion of the bladder neck and trigone.

NEW OCCLUDING URETERAL CATHETER AND CYSTOSCOPES FOR FUNCTIONAL RENAL TESTS.

EDGAR GARCEAU,
BOSTON, MASS.

The instruments were devised by the writer to collect the total output of urine from each kidney during an examination to test the capacity for work of each. The catheters heretofore employed for this purpose have not been satisfactory. Those with bulbous enlargements at the ureteral end do not always succeed in entering the canal and they do not always completely plug it even when they do enter. Those having a small inflatable rubber balloon at the ureteral end which can be inflated after the catheter is in position are open to the objection that the rubber soon deteriorates. The commonest method has been to pass with a cystoscope two No. 8 Fr. catheters, one on each side, and to trust that there will be no leakage alongside the instrument. Leakage is detected by means of a catheter laid in the bladder. Larger double catheterizing cystoscopes which might take larger catheters are not feasible, on account of their size. With a No. 8 Fr. catheter in each ureter leakage alongside the instrument occurs in forty-eight per cent of the cases. It amounts to twenty ccm. or less in twenty-one per cent; twenty to fifty ccm. in eight per cent; fifty to one hundred ccm. in three per cent; and one hundred ccm. or more in sixteen per cent. These figures are for the two-

hour polyuria test in which the catheter remains *in situ* during that length of time.[1]

The importance of collecting the total output of urine from each kidney cannot be overestimated in functional renal examination. If we would deduce anything of value from delicate tests we must have the exact amount. It is sufficient for our purpose if we can be sure that we can collect the total amount from a single kidney, for by laying a catheter in the bladder we shall get the urine from the other side. This will be especially appreciated in those cases in which, from pathologic, anatomic, or congenital causes, but one ureter can be catheterized. The writer has known a single ureter to be catheterized in a case of single kidney; leakage has occurred alongside the catheter; the urine found in the bladder was taken for urine from the opposite kidney; the only kidney was removed; and the patient promptly died.

The catheter devised by the writer,[2] made by Eynard of Paris, has a length of ninety cm. It has a calibre of No. 11 Fr. at its outer end and this calibre is maintained to within twenty cm. of the opposite end. From this point it tapers gradually and progressively to the tip of the instrument, where it has a calibre of only No. 6 Fr. This end is open and has a flute tip; below the tip there are two additional openings through which urine may enter. It is easy to see that, once introduced, the catheter fits into the ureter exactly like a conical cork into the neck of a bottle and completely plugs the canal, so that all the urine coming from the kidney must go through the instrument. A catheter laid in the bladder col-

[1] In the sixteen cases in which the leakage was 100 ccm. or more the figures were: 134 ccm., 204 ccm., 107 ccm., 162 ccm., 220 ccm., 250 ccm., 128 ccm., 132 ccm., 312 ccm., 158 ccm., 150 ccm., 180 ccm., 134 ccm., 116 ccm., 208 ccm., 134 ccm.

[2] See Boston Medical and Surgical Journal, 1910, CLXII, 745, and Berlin. Klin. Wochenschrift, 1910, No. 23, June 6, p. 1091.

lects the urine from the opposite side. There are three more decided advantages attained by the use of this catheter; one is, that the capacity of the renal pelvis may be exactly determined by injecting measured liquid into it through the catheter; the second is, that strictures of the lower end of the ureter may be safely and easily dilated; the third is, that a rapid diagnosis of the following conditions can be made: (1) solitary kidney, (2) kidney inactive from former disease, (3) blocked ureter. Solitary kidney is diagnosed by finding urine on the catheterized side and none in the bladder; we should expect no history of renal pain or other symptoms on the side in question; we should also not be surprised at a smooth bladder without an opening in the spot where normally the ureteral orifice is found. A kidney, inactive and non-secreting, is diagnosed by the previous history. If the patient has had renal pain, if there has been tumor, and especially if there has been abundant pyuria in former times, we may diagnose some suppurative process, very commonly tuberculosis, which has gradually destroyed the kidney and has rendered it inactive. Blocked ureter may be of the acute or the chronic variety. The active form is usually due to stone. Here the fulminating symptoms, colic, general disturbance, and local tenderness, leave no doubt as to the diagnosis. In the chronic form, also generally due to stone, the X-ray will be of assistance; also a history of previous pain in the kidney, together with other localizing symptoms.

When the occlusive catheter was first devised it was thought that it could be advantageously used by adopting Albarran's method of first introducing into the ureter a small flexible whalebone bougie, and subsequently slipping the catheter over this as a guide after removing the cystoscope. In the writer's

experience this was not satisfactory, for the reason that it was not possible to see what was going on in the bladder; the catheter would not enter the ureter and buckling occurred; there was consequently danger of lacerating the mouth of the ureter. This scheme was abandoned and it was thought best to devise special instruments to take the No. 11 Fr. occlusive catheter.

The first instrument was made by Collin of Paris.[1] It is nothing more than a Brenner instrument slightly modified by the writer. The catheterizing tube is made to take a No. 13 Fr. catheter and it is further modified by having a smaller beak and a removable elbow at the ocular end of the catheterizing tube, which serves to deflect the catheter as it enters the lumen. In the original Brenner model as made by Loewenstein of Berlin, the catheter tube is straight, and this brings the catheter close to the face as it is being introduced. With the writer's instrument, which has a calibre of No. 29 Fr. in one diameter and No. 17 Fr. in the other, or about No. 23 Fr. over all, one can enter practically all urethræ, male and female. The writer has used it with success in both sexes. It is, however, particularly adapted to the female, though it can be used in the male provided there is no abnormality in the bladder, such as hypertrophied prostate, etc. It will not prove serviceable in female bladders in which there is pronounced relaxed outlet with cystocele. It is easy of introduction and catheterization is very simple.

In order to overcome the objections of the first instrument the writer [2] has devised an indirect vision cystoscope which is made by Loewenstein of Berlin. With it one can catheterize any ureter. The instrument, as the diagram shows, consists of two parts,

[1] See La Presse Médicale, Paris, 1911, No. 10, p. 91.
[2] Berlin. Klin. Wochenschrift, 1911, No. 16, XLVIII, 716.

the upper part being the catheterizing apparatus, the lower the optical. The under surface of the catheterizing tube is grooved and the groove fits tightly into the lower optical part when pressed into it. The two pieces together form a single instrument. There is a toothed wheel working on a toothed plate which is soldered onto the catheter tube. By turning this wheel the upper or catheterizing part is made to slide at will on the lower or optical part in either direction. When the instrument is to be introduced into the bladder the upper tube is made to slide by means of the screw towards the beak of the instrument as far as it will go; this makes its introduction into the bladder an easy matter. Once in the bladder, however, the screw is turned in the opposite direction; this causes the upper tube to slide towards the operator, and uncovers the prism in the optical part which is situated near the beak in the usual place. The field of vision is large, there being no obstruction to the rays of light from the sides of the cystoscope, as the whole catheterizing tube slides away from the lens below. Catheterizing is performed in the usual way, by introducing the catheter into the catheterizing tube, which takes No. 11 Fr., and by causing the tip of the catheter to be deflected by means of the shutter, which has a separate screw for opening and shutting it, differing not at all from that in the latest models of cystoscopes. If desired, fluid in the bladder can be changed by removing the optical telescope and by irrigating through the lower tube. The cystoscope as a whole is of No. 25 Fr. in one diameter and No. 15 Fr. in the other, making it about twenty Fr. over all. It is easy of introduction in any normal urethra, male or female. Cleansing of the instrument is readily done by separating it into its component parts. One of the chief features of the instrument is that when the upper tube or catheteriz-

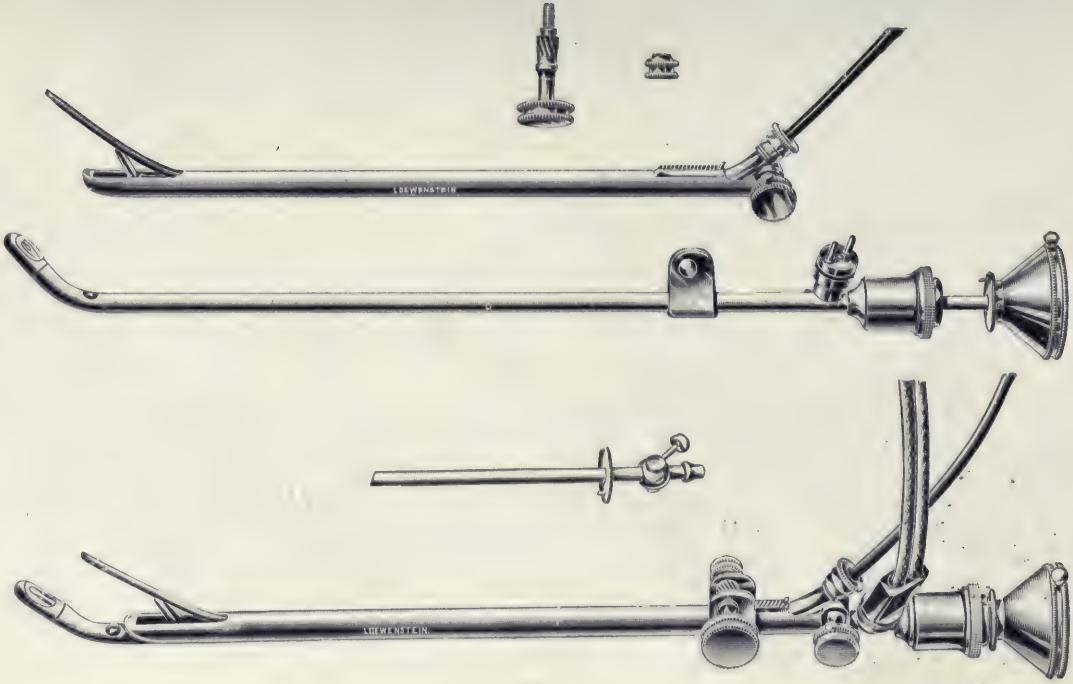


Fig. 1

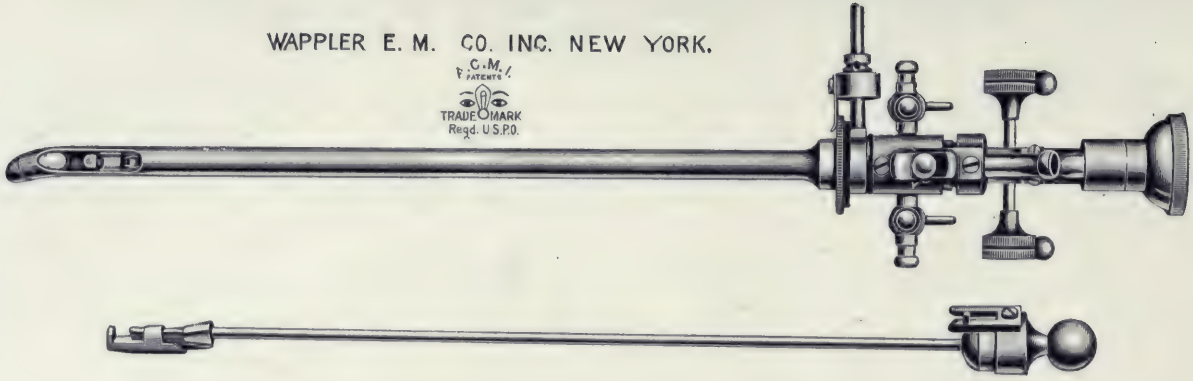

WAPPLER E. M. CO. INC. NEW YORK.
C.M.
PATENTS
TRADE MARK
Regd. U.S.P.O.

Fig. 2

N°11
N°11
N°11
N°9

Fig. 3

ing apparatus is removed from the optical part, the latter constitutes in itself a complete irrigating examining cystoscope of No. 15 Fr.

The last instrument to be described is one devised by the Wappler Manufacturing Company of New York to take the writer's catheters. It consists of two parts, an outer sheath, and a catheterizing and optical part combined; the latter fits into the former. The novel features of the instrument are these: the vesical lens is at the heel of the instrument and not on top as in most indirect cystoscopes; this lens points directly downwards towards the base of the bladder; the image is thus an indirect one, but it is made direct by appropriate lenses so that the observer sees the bladder exactly as it is; the shutter which deflects the catheter is likewise situated on the under side of the instrument, at the heel, instead of on top, as it is in most instruments, thus giving a great advantage over other cystoscopes because the catheter does not have to be deflected very much; by a system of rubber caps, which fit on the end of the catheterizing tube just below the external ocular, either a single large occlusive catheter of No. 11 Fr. can be introduced, or else two No. 7 Fr. ureteral catheters of the usual design can be introduced, one into each ureter; irrigation is possible with the catheters *in situ*. To manipulate the instrument the catheterizing apparatus is removed from the sheath and an obturator introduced, which closes the aperture at the heel. The cystoscope is now passed into the bladder, the obturator withdrawn, and the catheterizing apparatus armed with the catheter introduced. The ureteral opening is found and the catheter shoved into it. The catheterizing piece is now removed from the sheath and a small-sized simple catheter is passed into the bladder through the sheath to collect the urine from the opposite kidney. The sheath is withdrawn,

leaving the ureteral and the vesical catheters in place.

The writer has used this instrument with satisfaction. Not only will it serve to catheterize easy ureters but difficult ones as well. It will be found excellent for prostatic cases, for the shutter will deflect the catheter so that it will enter at any angle. The lenses are such that they will reflect an image even when the object is directly upon the vesical lens; it is thus an excellent urethroscope.

In the female there is no difficulty in introducing these catheters directly into the ureter by means of the ordinary tubular cystoscopes such as the Kelly, Pawlik, Garceau, Luys, etc. In the male, however, this is not very feasible.

Experimental Work.

In the cases reported below the following details were observed: An occluding catheter was passed into the ureter by means of one of the cystoscopes described. On two occasions two catheters were passed, one on each side. The catheter was gently and not too forcibly pushed into the lumen so that it fitted snugly in the canal. An ordinary rubber or metal catheter was laid in the bladder after the removal of the cystoscope. The writer has found it an advantage to have the vesical catheter perforated with many holes at the vesical end so as to collect the vesical urine with greater assurance. Male and female patients were catheterized, fifteen in all. The catheter remained *in situ* a variable length of time, from a half hour to two and a half hours. In all cases at the conclusion of the test and before the catheter was removed, an injection of indigo carmine in strong solution, in amounts varying from eight ccm. to fifteen ccm. was made up into the kidney, and careful observation made, most times with a cystoscope in the bladder viewing the ureteral orifice, at times

observing the bladder urine as it dribbled in drops from the bladder catheter, in order to see if there was reflux of colored urine through the ureteral orifice. Patients on returning home were directed to go to bed, to drink two or three glassfuls of hot milk at intervals, and to take urotropin in ten-grain doses three times a day for a few days. They were all in good condition the day after, with one exception, which will be referred to later.

Case I. Female, aged forty-two years. Normal orifice. No. 11 Fr. occlusive catheter passed ten cm. into the left ureter. Time in ureter, twenty minutes. Injection of strong methylene blue solution into renal pelvis. No reflux, as proved by cystoscope.

Case II. Female, aged fifty years. Normal orifice. No. 11 Fr. occlusive catheter passed into the right ureter for seven cm. and allowed to remain twenty minutes. Injection of eight ccm. indigo carmine solution through the catheter. No reflux. Capacity of renal pelvis, eight ccm.

Case III. Female, aged forty-five years. Normal ureteral orifice. No. 11 Fr. occlusive catheter passed ten cm. into the right ureter and allowed to remain thirty minutes. Injected twelve ccm. indigo carmine solution into renal pelvis. No reflux, as proved by the cystoscope. Capacity of the renal pelvis, twelve ccm.

Case IV. Female, aged fifty years. Normal ureteral orifice. Passed No. 11 Fr. occlusive catheter into left ureter and allowed it to remain in place one hour. Injected seven ccm. indigo carmine solution into renal pelvis. No reflux observed with the cystoscope. Capacity of renal pelvis, seven ccm.

Case V. Female, aged twenty-eight years. Normal orifice. Passed No. 11 Fr. occlusive catheter

into right ureter for seventeen cm. and allowed it to remain in place one hour and a quarter. Injected eight ccm. indigo carmine solution into catheter. No reflux. Capacity of renal pelvis, eight ccm. In this case the patient was being examined with reference to the working capacity of the two kidneys. At the beginning of the hour and a quarter she received an injection of six miligrams of phenolsulphonephthalein. Color appeared on the right side, the catheter side, in thirty minutes, and amounted in the hour and a quarter to six per cent only; while color appeared in the dribbling bladder urine (left ureteral urine) only at the end of the hour and a half period and amounted only to a mere trace.

Case VI. Female, aged thirty-five years. Orifice normal. No. 11 Fr. occlusive catheter passed into left ureter for fifteen cm., and allowed to remain thirty minutes. Then eight ccm. indigo carmine solution injected into the catheter. No reflux. Capacity of renal pelvis, eight ccm.

Case VII Female, aged thirty-six years Normal orifice. No. 11 Fr. catheter passed into the right ureter and allowed to remain thirty minutes. Injected ten ccm. indigo carmine solution through the catheter. No reflux observed with the cystoscope. Capacity of the renal pelvis, ten ccm.

Case VIII. Female, aged fifty years. Orifice normal. No. 11 Fr. occlusive catheter passed into each ureter for fifteen cm. and allowed to remain for thirty minutes. Right catheter first passed, then cystoscope removed and reintroduced alongside the catheter *in situ* and left catheter passed in. A vesical catheter passed into the bladder collects no urine.

Case IX. Male, aged twenty-eight years. Normal orifice. No. 11 Fr. occlusive catheter passed into the right ureter for fifteen cm. and allowed to remain one hour *in situ*. Solution of indigo carmine

injected through the catheter at the beginning of the hour. No reflux observed with the cystoscope. At the end of the hour indigo carmine again injected through the catheter. No reflux.

Case X. Female, aged fifty years. Orifice normal. No. 11 Fr. occlusive catheter passed into the left ureter for fifteen cm. and allowed to remain for thirty minutes. Then eight ccm. solution of indigo carmine injected through the catheter. No reflux seen with the cystoscope. Capacity of the renal pelvis, eight ccm.

Case XI. Female, aged fifty-five years. Both orifices much dilated as the result of previous dilatation for strictures on each side, and also distortion from old vaginal cystotomy. No. 11 Fr. occlusive catheter passed into the right ureter for twenty cm. Injection of indigo carmine solution returns in part along the course of the ureter and is seen with the cystoscope in the bladder. In this case the patulous condition was the cause of the reflux. But see Case XII.

Case XII. Same patient as in Case XI. Subsequent examination. This time a No. 11 Fr. occlusive catheter was laid in each patulous ureter for fifteen cm. and a vesical catheter was passed into the bladder. They remained in place for two hours and a half. Meanwhile not a drop of urine appeared in the bladder. This case shows how severe a test for leakage is the indigo carmine injection.

Case XIII. Female, aged twenty-eight years. Right orifice, normal. Left orifice not to be found. A No. 11 Fr. occlusive catheter passed into the right ureter and allowed to remain for thirty minutes. No urine was collected with the vesical catheter. Injection of eight ccm. of indigo carmine solution into the right ureter. No reflux observed with the cystoscope. Eight years previously a catheter had been passed on the left or diseased side and remained

in place for five hours. No urine was collected. A diagnosis of inactive left kidney was made from the following data: absence of urine on left side, previous history of left renal pain, abundant pyuria in former years, now ceased.

Case XIV. Female, aged forty-two years. Orifice normal. The left ureter was catheterized with a No. 11 Fr. occlusive catheter and the instrument passed into the ureter for seventeen cm. It remained in place for one hour. Then four ccm. of indigo carmine solution were injected into the ureter. No reflux observed with the cystoscope.

Case XV. Female, aged fifty years. Catheter will not enter the right ureter because of low stricture. Left ureteral orifice "golf holed" and enlarged from long standing renal suppuration on the left side. Left ureter catheterized with No. 13 Fr. occlusive catheter and the instrument passed into the ureter for twenty cm. It remained in place two hours. Insignificant quantity of urine from the right side; good amount from the left side. No reflux.

The results obtained in these cases show that the catheter is really occlusive. The injection of the colored fluid under some pressure without reflux, save in a single case and that in abnormally dilated orifices, was a severe test. The fact that in this case two catheters were later experimented with successfully for two hours and a half without reflux, shows that even in dilated orifices the catheter may be relied upon to collect the urine.

In Cases I and V the patients had renal colic following the examination. The writer feels sure that it was due to the test injection of indigo carmine, because during the examination while the catheters were in place there was no pain, the colic beginning immediately after the injection. In Case I the

catheter was in place for half an hour; in Case V, a tubercular kidney, it was in place for an hour and a quarter.

Bleeding was noted once. It was in the case in which the catheters were left in the ureters for two and one half hours. It was very slight.

The writer may fairly claim the following for the instruments: —

(1) Cystoscopes which will take a No. 11 Fr. catheter.

(2) Assurance that with the No. 11 Fr. catheter the total output of urine will be collected from one kidney, leaving the urine from the other kidney to be collected by the vesical catheter. In cases in which there is an enlarged "golf hole" ureteral orifice the No. 13 Fr. catheter may be used (Case XV) with the Brenner instrument. It will be found available in most bladders, male and female.

(3) Possibility of measuring the capacity of the renal pelvis with accuracy with the catheter, this being the only instrument which will do this unfailingly.

(4) Possibility of dilating with the conical catheter strictures of the lower end of the ureter.

(5) Possibility of diagnosing with ease (*a*) solitary kidney, (*b*) kidney inactive from former disease, (*c*) blocked ureter.

American Urological Association.

ROSTER.

HONORARY MEMBERS.

Casper, L. ..... Berlin, Germany
Dorst, J. ..... Amsterdam, Holland
Duhot, Robert ..... Brussels, Belgium
Fenwick, E. Hurry, F. R. C. S. ..... London, England
Finger, E. ..... Vienna, Austria
Guyon, J. C. Felix ..... Paris, France
Israel, James ..... Berlin, Germany
Kollmann, Arthur ..... Leipzig, Germany
Knorr, Richard ..... Berlin, Germany
Morris, Henry, F. R. C. S. ..... London, England
Oberländer, F. M. ..... Dresden, Germany
Posner, Carl ..... Berlin, Germany
Powell, W. Wyndham, F. R. C. S. ..... London, England
Von Frisch, A. ..... Vienna, Austria
Wossidlo, Hans R. ..... Berlin, Germany
Zuckerkandl, Otto ..... Berlin, Germany

ACTIVE MEMBERS.

Abell, Irvin ..... 1228 2d St., Louisville, Ky.
Alexion, Alex. ..... 153 E. 27th St., New York, N. Y.
Allen, Gardner W. ..... 419 Boylston St., Boston, Mass.
Alvarez, José R. ..... 49 E. 92d St., New York, N. Y.
Anderson, Robert L. ..... Sterling St., Pittsburgh, Pa.
Angle, Edw. J. ..... 1215 O St., Lincoln, Neb.
Ayers, Winfield ..... 616 Madison Ave., New York, N. Y.

Balch, F. G. ..... 279 Clarendon St., Boston, Mass.
Bangs, L. Bolton ..... 20 E. 46th St., New York, N. Y.
Barnett, Charles E. ..... Fort Wayne, Ind.
Barney, J. D. ..... 374 Marlborough St., Boston, Mass.
Barringer, B. S. ..... 109 E. 34th St., New York, N. Y.
Bartels, Leo G. ..... 1050 Century Bldg., St. Louis, Mo.
Baum, William L. ..... 31 N. State St., Chicago, Ill.
Bazet, Louis ..... Phelan Bldg., San Francisco, Cal.
Beal, Howard W. ..... 55 Pearl St., Worcester, Mass.

Bedell, Charles E. .....410 West End Ave., New York, N. Y.
Beers, Nathan T. .....516 Nostrand Ave., Brooklyn, N. Y.
Begg, Colin L. .....131 E. 17th St., New York, N. Y.
Bevan, A. D. ..... 122 S. Michigan Blvd., Chicago, Ill.
Belfield, W. T. .....32 N. State St., Chicago, Ill.
Bickford, Louis C. .....Cawker Bldg., Milwaukee, Wis.
Bierhoff, Frederick .....10 W. 61st St., New York, N. Y.
Binney, Horace .....1 Marlborough St., Boston, Mass.
Bishop, R. W. .....138 N. State St., Chicago, Ill.
Bissell, Jos. B. .....45 W. 55th St., New York, N. Y.
Blake, J. B. .....161 Beacon St., Boston, Mass.
Blanchard, Geo. W. .....Highland Falls, N. Y.
Blassucci, Ernesto .....679 Lexington Ave., New York, N. Y.
Block, J. .....Argyle Bldg., Kansas City, Mo.
Bloom, I. N. .....The Atherton Bldg., Louisville, Ky.
Boehm, J. L. .....715 N. 8th St., St. Louis, Mo.
Bonney, Charles W. .....1117 Spruce St., Philadelphia, Pa.
Boogher, J. Leland .....705 Olive St., St. Louis, Mo.
Bosher, L. C. .....422 E. Franklin St., Richmond, Va.
Boucher, J. B. .....25 Charter Oak St., Hartford, Conn.
Bovee, J. Wesley .....The Rochambeau, Washington, D. C.
Braasch, W. F. .....Care Dr. Mayo, Rochester, Minn.
Brand, Adolph .....1431 Madison Ave., New York, N. Y.
Bremmerman, L. W. .....7 W. Madison St., Chicago, Ill.
Briggs, Fred M. .....31 Massachusetts Ave., Boston, Mass.
Bronner, Walter B. .....Louisville, Ky.
Brouner, Walter B. .....27 W. 9th St., New York, N. Y.
Brown, Percy .....155 Newbury St., Boston, Mass.
Bryan, Robert C. .....301 W. Grace St., Richmond, Va.
Bryant, W. C. .....7070 Jenkins Arcade, Pittsburg, Pa.
Buerger, Leo .....40 E. 41st St., New York, N. Y.
Bugbee, H. G. .....40 E. 41st St., New York, N. Y.
Burford, C. E. .....955 Hamilton Ave., St. Louis, Mo.
Burnam, Curtis Field .....1418 Eutaw Place, Baltimore, Md.
Burt, James C. .....Westinghouse Bldg., Pittsburgh, Pa.
Butler, John .....Pillsbury Bldg., Minneapolis, Minn.

Cabot, A. T. .....1 Marlborough St., Boston, Mass.
Cabot, Hugh .....87 Marlborough St., Boston, Mass.
Carney, T. J. .....294 W. 55th St., New York, N. Y.
Carpenter, Thos. B. .....533 Franklin St., Buffalo, N. Y.
Charlton, Frederick .....Willoughby Bldg., Indianapolis, Ind.
Chase, H. M. .....409 Marlborough St., Boston, Mass.
Chassaignac, Charles .....211 Camp St., New Orleans, La.

Cheever, D. .....20 Hereford St., Boston, Mass.
Chetwood, Charles H. .....25 Park Ave., New York, N. Y.
Chute, Arthur L. .....350 Marlborough St., Boston, Mass.
Clark, Geo. C. .....142 Beacon St., Boston, Mass.
Clark, J. Bayard .....616 Madison Ave., New York, N. Y.
Codman, E. A. .....227 Beacon St., Boston, Mass.
Collings, Howard P. .....Hot Springs, Ark.
Collings, S. P. .....Duncan-Stuart Bldg., Hot Springs, Ark.
Corbus, B. C., 602 Reliance Bldg., 32 N. State St., Chicago, Ill.
Corrigan, Geo. F. .....344 Lafayette St., Newark, N. Y.
Cotton, F. J. .....483 Beacon St., Boston, Mass.
Creamer, Joseph M., Euclid Hall, Broadway and 85th St., New York, N. Y.
Cumston, Charles G. .....871 Beacon St., Boston, Mass.
Cunningham, J. H., Jr. .....46 Gloucester St., Boston, Mass.

Davis, John B. .....909 17th St., Denver, Col.
Davis, Lincoln .....213 Beacon St., Boston, Mass.
Davis, William H. .....Railway Exchange Bldg., Denver, Col.
Delacroix, A. C. .....Chief Surgeon's Office, Manila, P. I.
Disque, T. L. .....707 Jenkins Bldg., Pittsburgh, Pa.
Dolphin, Benjamin E. .....430 W. 116th St., New York, N. Y.
Doyno, Gennora .....325 E. 17th St., New York, N. Y.
Drennen, C. Travis .....302 Central Ave., Hot Springs, Ark.

Eastman, J. Rilus .....331 N. Delaware St., Indianapolis, Ind.
Eaton, Geo. L. .....Elkan Gunst Bldg., 323 Geary St., San Francisco, Cal.
Echeverria, Martin J. .....248 W. 76th St., New York, N. Y.
Eckstein, William G. .....14 E. 60th St., New York, N. Y.
Eisendrath, D. N. .....31 N. State St., Chicago, Ill.
Eisenstaedt, J. S. .....32 N. State St., Chicago, Ill.
Elam, W. T. .....Logan Block, St. Joseph, Mo.
Erdmann, John F. .....60 W. 52d St., New York, N. Y.
Erdman, Bernard, 432 Newton-Claypool Bldg., Indianapolis, Ind.
Ewald, L. A. .....48 E. 87th St., New York, N. Y.

Ferris, Cleveland .....535 W. 142d St., New York, N. Y.
Fischkin, E. A. .....32 N. State St., Chicago, Ill.
Fleming, Henry Craig .....2030 Broadway, New York, N. Y.
Fletcher, E. A. .....128 Wisconsin St., Milwaukee, Wis.
Fletcher, R. D. .....P. O. Box 596, Winnipeg, Manitoba, Can.
Foote, Chas. G. .....The Osborn, Cleveland, Ohio
Foster, B. B. .....662 Congress St., Portland, Me.

Fowler, A. L. .....929 Candler Bldg., Atlanta, Ga.
Fowler, H. A.....The Cumberland, Washington, D. C.
Fowler, O. S. .....624 Metropolitan Bldg., Denver, Col.
Frank, Louis .....Louisville, Ky.
Friedrich, L. H.....318 Center St., Chicago, Ill.
Friedlander, David.....146 Grant Ave., San Francisco, Cal.
Frost, H. B. .....31 N. State St., Chicago, Ill.
Fuller, Eugene.....252 Lexington Ave., New York, N. Y.
Fuller, Homer G.....1615 Florida Ave., Washington, D. C.

Gallant, A. E. .....540 Madison Ave., New York, N. Y.
Garceau, Edgar .....397 Marlborough St., Boston, Mass.
Gardner, James A.....403 Franklin St., Buffalo, N. Y.
Geraghty, J. T.....Professional Bldg., Baltimore, Md.
Gifford, N. H. .....13 Green St., Providence, R. I.
Gordon, G. S.....626 Granville St., Vancouver, B. C.
Gradwohl, R. B. H. .....222 Victoria Bldg., St. Louis, Mo.
Grasse, D. F. .....805 W. Madison St., Chicago, Ill.
Gray, Herbert L.....238 W. 22d St., New York, N. Y.
Greene, R. H.....78 E. 56th St., New York, N. Y.
Grosse, A. B. .....162 Post St., San Francisco, Cal.
Gross, Louis .....45 Kearny St., San Francisco, Cal.
Guiteras, Ramon.....80 Madison Ave., New York, N. Y.

Hagner, Francis R.....The Farragut, Washington, D. C.
Hall, Frank J.....Argyle Bldg., Kansas City, Mo.
Hall, Robert W.....118 E. 29th St., New York, N. Y.
Hamer, Homer G. ...Newton-Claypool Bldg., Indianapolis, Ind.
Harpster, Chas. M. .....701-705 Madison Ave., Toledo, Ohio
Harrigan, Anthony Hart ....249 W. 102d St., New York, N. Y.
Harris, Burton S. .....475 Greene Ave., Brooklyn, N. Y.
Harris, M. L. .....32 N. State St., Chicago, Ill.
Hartung, Frederick A. .....Keenan Bldg., Pittsburgh, Pa.
Hatch, J. Leffingwell .....52 W. 37th St., New York, N. Y.
Hawkes, Forbes .....42 E. 26th St., New York, N. Y.
Hawkins, John A. .....Keenan Bldg., Pittsburgh, Pa.
Hayden, J. R. .....121 W. 55th St., New York, N. Y.
Hayes, D. J. .....Matthews Bldg., Milwaukee, Wis.
Heidengsfeld, M. L. .....19 W. 7th St., Cincinnati, Ohio
Heitzman, Louis .....110 W. 78th St., New York, N. Y.
Herbst, R. H. .....32 N. State St., Chicago, Ill.
Hirsch, Chas. S. .....908 Pine St., Philadelphia, Pa.
Holliday, Geo. A. ..8047 Jenkins Arcade Bldg., Pittsburgh, Pa.
Hopkins, T. A. .....319 Century Bldg., St. Louis, Mo.
Howard, L. V. .....Santa Monica, Cal.

Hühner, Max .....667 Madison Ave., New York, N. Y.
Hunner, Guy Leroy .....2305 St. Paul St., Baltimore, Md.
Hupp, LeMoyne .....61 14th St., Wheeling, W. Va.
Hyman, A. .....40 E. 41st St., New York, N. Y.

Irvine, Austen D. .....731 Sherbrooke St., Montreal, Canada

Jacobson, Henry ...429 Cent. Nat. Bank Bldg., St. Louis, Mo.
Jacobson, Julius H.....239 Michigan St., Toledo, Ohio
Jamieson, W. R. .....616-618 Anson Mills Bldg., El Paso, Tex.
Jenner, Albert G. .....428 Jefferson St., Milwaukee, Wis.
Johnson, F. M.....43 Tremont St., Boston, Mass.
Johnson, H. McC. .....Lenmar Bldg., St. Louis, Mo.
Johnson, W. S. .....350 Post St., San Francisco, Cal.
Jones, Arthur T. .....214 Benefit St., Providence, R. I.

Kane, R. Emmett .....312 Humbolt Bldg., St. Louis, Mo.
Keefe, John W. .....259 Benefit St., Providence, R. I.
Keidel, Albert.....847 Park Ave., Baltimore, Md.
Keller, John G. .....209 Wayne Bldg., Toledo, Ohio
Kelly, Howard A. .....1418 Eutaw Place, Baltimore, Md.
Kelly, W. D. .....135 Lowry Arcade, St. Paul, Minn.
Kemp, Robt. Coleman .....107 E. 57th St., New York, N. Y.
Keyes, Edward L., Jr. .....109 E. 34th St., New York, N. Y.
King, Ernest F. .....223 Bond Bldg., Washington, D. C.
Kingman, L. C. .....212 Benefit St., Providence, R. I.
Kolischer, Gustave .....108 N. State St., Chicago, Ill.
Koll, Irvin S. .....31 N. State St., Chicago, Ill.
Kraus, H. A. .....108 N. State St., Chicago, Ill.
Kreissel, F. .....108 N. State St., Chicago, Ill.
Kretschmer, Herman L. .....29 East Madison St., Chicago, Ill.
Krotoszyner, Martin .....2672 Pine St., San Francisco, Cal.
Kurtzeborn, Edwin .....5005 Delmar Bldg., St. Louis, Mo.

Ladd, Ira B. .....423 East Main St., Stockton, Cal.
Lauterman, M.....196 Peel St., Montreal, Can.
Laws, Wm. V. .....Hot Springs, Ark.
Lee, Edward Wallace .....616 Madison Ave., New York, N. Y.
Lehr, L. C. .....1737 H St., Washington, D. C.
Leiter, H. L. .....425 S. Warren St., Syracuse, N. Y.
Lespinasse, Victor D., Chicago Savings Bank Bldg., Chicago, Ill.
Lesser, A. Monae.....16 W. 68th St., New York, N. Y.
Lewis, Bransford .....1050 Century Bldg., St. Louis, Mo.
Lieberthal, David .....31 N. State St., Chicago, Ill.
Likes, Sylvan H. .....1134 Linden Ave., Baltimore, Md.

Loux, H. R. .....1614 N. Broad St., Philadelphia, Pa.
Lockwood, Chas. D. .....Pasadena, Cal.
Lower, Wm. E. .....1021 Prospect Ave., S. E., Cleveland, Ohio
Lund, F. B. .....529 Beacon St., Boston, Mass.
Lydston, G. Frank .....32 N. State St., Chicago, Ill.
Lyon, H. N. .....Humbolt Bldg., St. Louis, Mo.
Lyons, Oliver .....16th St. and Court, Denver, Colo.

MacGowan, Granville .....602 Lissner Bldg., Los Angeles, Cal.
Mackay, Albert E. .....711 Oregonian Bldg., Portland, Ore.
MacKee, Geo. H. .....58 W. 58th St., New York, N. Y.
MacMartin, D. R. .....77 Jackson Blvd., Chicago, Ill.
MacRae, Thomas .....271 W. 73rd St., New York, N. Y.
McCallum, F. M. .....719 Gloyd Bldg., Kansas City, Mo.
McClinton, Nelson F. .....32 N. State St., Chicago, Ill.
McConnell, E. G. .....406 Sutton St., San Francisco, Cal.
McCown, P. E., 320 Newton-Clayton Bldg., Indianapolis, Ind.
McGlasson, I. L. .....Waco, Texas
McGonigle, Murray B. .....224 Michigan St., Toledo, Ohio
McGowan, John P. .....40 E. 41st St., New York, N. Y.
McKay, H. F. .....Marquam Bldg., Portland, Ore.
McKenna, C. M. .....108 N. State St., Chicago, Ill.
McKimm, G. F. .....5 Garfield Place, Cincinnati, Ohio
McKnight, Everett J. .....110 High St., Hartford, Conn.
McRae, F'oyd Wi'cox. .....Peters Bldg., Atlanta, Ga.
Manton, W. P. .....32 Adams Ave., W., Detroit, Mich.
Mark, Ernest G. .....Gloyd Bldg., Kansas City, Mo.
Marsh, Edward H. .....448 9th St., Brooklyn, N. Y.
Martin, W. F. .....The Sanitarium, Battle Creek, Mich.
Mason, Frederick S. Hotel Brevort, 5th Ave., and 8th St., New York, N. Y.
Meyer, Conrad M. .....136 E. 17th St., New York, N. Y.
Meyer, Henry .....240 Stockton St., San Francisco, Cal.
Meyer, Willy .....700 Madison Ave., New York, N. Y.
Miller, G. Brown. .....1730 K St., Washington, D. C.
Mitchell, Alfred, Jr. .....New Baxter Bldg., Portland, Me.
Molony, Martin. .....Head Bldg., San Francisco, Cal.
Moore, H. A. .....Newton-Claypool Bldg., Indianapolis, Ind.
Morton, H. H. .....32 Schermerhorn St., Brooklyn, N. Y.
Mowry, Albert E. .....3505 Indiana Ave., Chicago, Ill.
Muclow, A. E. .....300 Sumner Ave., Brooklyn, N. Y.
Muren, G. Morgan .....11 E. 48th St., New York, N. Y.
Murphy, A. I. .... Westinghouse Bldg., 9th and Penn. Ave., Pittsburgh, Pa.
Nelken, A. .....502 Baronne St., New Orleans, La.

Newmark, Philip .....511 Security Bldg., Los Angeles, Cal.
Nordeman, Herman F.....24 W. 45th St., New York, N. Y.
Northrop, E. R. .....417 Paulsen Bldg., Spokane, Wash.

O'Crowley, C. R. .....12 Lombardy St., Newark, N. J.
O'Neil, R. F. .....379 Beacon St., Boston, Mass.
Ormsby, O. S. .....32 N. State St., Chicago, Ill.
Osgood, A. T. .....40 E. 41st St., New York, N. Y.
Owre, Oscar .....706-7 Masonic Temple, Minneapolis, Minn.

Page, Kingman B.....24 W. 120th St., New York, N. Y.
Patton, J. Allen .....Med. Dept. Prudential Life Ins. Co., Newark, N. J.
Paul, Thomas M. .....King Hill Bldg., St. Joseph, Mo.
Peck, Geo. A., 87 Centre Ave., New Rochelle, New York, N. Y.
Peck, Roy H. .....15 Temple St., Springfield, Mass.
Pedersen, James .....40 E. 41st St., New York, N. Y.
Pedersen, Victor Cox .....45 W. 9th St., New York, N. Y.
Pendergrast, L. H. .....Memphis Trust Bldg., Memphis, Tenn.
Pentlarge, Victor H. .....380 Sterling Place, Brooklyn, N. Y.
Perry, H. J. .....636 Beacon St., Boston, Mass.
Peterkin, Guy S.....701–3 Alaska Bldg., Seattle, Wash.
Pfarre, Edw. R. .....64 W. 54th St., New York, N. Y.
Phillips, G. M.....Commercial Bldg., St. Louis, Mo.
Pilcher, Paul M. .....145 Gates Ave., Brooklyn, N. Y.
Pitts, Herman C.....210 Benefit St., Providence, R. I.
Porter, Allen L. .....402 Sharp Bldg., Kansas City, Mo.
Porter, Charles A. .....254 Beacon St., Boston, Mass.
Porter, W. H., The Lathrop, 46 W. 83d St., New York, N. Y.
Potter, Geo. E. .....1491 Woodward Ave., Detroit, Mich.

Quinby, W. C. .....396 Marlborough St., Boston, Mass.

Rand, D. H. .....Swetland Bldg., Portland, Ore.
Ravogli, A.....5 Garfield Place, Cincinnati, Ohio
Ravold, A. N. .....Chemical Bldg., St. Louis, Mo.
Read, J. Sturdivant .....228 Clinton St., Brooklyn, N. Y.
Reid, W. B. .....219 N. Washington St., Rome, N. Y.
Reilly, F. H. .....296 Columbus Ave., New Haven, Conn.
Reinle, George G. ....60–61 MacDonough Bldg., Oakland, Cal.
Reynolds, W. S. .....66 W. 71st St., New York, N. Y.
Ricketts, B. Merrill ..Cor. 4th and Broadway, Cincinnati, Ohio
Rigdon, R. L. .....Chronicle Bldg., San Francisco, Cal.
Rininger, Edmund Marburg...501 Alaska Bldg., Seattle, Wash.

Robbins, Frederick W. .....101 Fort St., W., Detroit, Mich.
Robertson, W. M. .....Humboldt Bldg., St. Louis, Mo.
Robinson, W. J. .....12 Mount Morris Park, New York, N. Y.
Rogers Daniel W. .....2204 Michigan Ave., Chicago, Ill.
Rosenthal, Melvin S. .....718 N. Howard St., Baltimore, Md.
Roth, Leon Joseph .....605 Pacific Bldg., Los Angeles, Cal.
Ruggles, E. Wood .....348 University Ave., Rochester, N. Y.

Sanders, O. B. .....358 Commonwealth Ave., Boston, Mass.
Sanford, Henry L. .....207 Osborn Bldg., Cleveland, Ohio
Schapira, S. Wm. .....1847 Madison Ave., New York, N. Y.
Scherck, H. J. .....309 Century Bldg., St. Louis, Mo.
Schmidt, Louis E., Suite 1616, The Mallers Bldg., Chicago, Ill.
Scudder, Charles L. .....209 Beacon St., Boston, Mass.
Seay, Cornelius J. .....208 W. 82d St., New York, N. Y.
Senn, Wm. N. .....32 N. State St., Chicago, Ill.
Shelmire, J. B. .....504 N. Texas Bldg., Dallas, Tex.
Sherman, Arthur L. .....449 Park Ave., New York, N. Y.
Silverberg, M. .....1018 Head Bldg., San Francisco, Cal.
Sinclair, D. A. .....40 E. 41st St., New York, N. Y.
Smillie, N. C. .....100 Crescent St., Montreal, Quebec, Can.
Smith, E. B. .....76 Waterman St., Providence, R. I.
Smith, E. E. .....26 E. 29th St., New York, N. Y.
Smith, E. O. .....19 W. 7th Ave., Cincinnati, Ohio
Smith, G. G. .....309 Marlborough St., Boston, Mass.
Smith, Jacob S. .....Daylight Bldg., Bellingham, Wash.
Smith, Oliver C. .....44 High St., Hartford, Conn.
Smith, Stafford B. .....268 W. 84th St., New York, N. Y.
Spencer, John C. .....Butler Bldg., 135 Stockon St., San Francisco, Cal.
Spitzer, W. M. .....Metropolitan Bldg., Denver, Col.
Squier, J. Bentley, Jr. .....49 E. 49th St., New York, N. Y.
Staley, R. W. .....334 Milton St., Cincinnati, Ohio
Stern, Chas. S. .....75 Pratt St., Hartford, Conn.
Stern, Heinrich .....250 W. 73d St., New York, N. Y.
Stevens, A. R. .....40 E. 41st St., New York, N. Y.
Stewart, Acheson .....4715 Fifth Ave., Pittsburgh, Pa.
Stewart, Douglas H. .....128 W. 86th St., New York, N. Y.
Stokes, A. C. .....503 Branders Bldg., Omaha, Neb.
Suggatt, O. L. .....Commercial Bldg., St. Louis, Mo.
Summers, J. E., Brander's Theatre Bldg., 15th and Dodge Sts., Omaha, Neb.
Sumney, H. C. .....305 Karback Bldg., Omaha, Neb.
Swinburne, Geo. K. .....64 E. 56th St., New York, N. Y.

Tauber, Elmore B. .....19 W. 7th St., Cincinnati, Ohio
Ten Broeck, Louis L. .....708 Jefferson St., Laporte, Ind.
Tenney, Benjamin .....308 Marlborough St., Boston, Mass.
Terry, H. .....274 Weybossett St., Providence, R. I.
Terry, P. R. .....Segal Bldg., Asheville, N. C.
Thienhaus, C. O. .....603 Milwaukee St., Milwaukee, Wis.
Thorndike, Paul .....24 Marlborough St., Boston, Mass.
Timberlake, Gideon .....Professional Bldg., Baltimore, Md.
Townsend, T. M. .....171 W. 71st St., New York, N. Y.
Townsend, William Warren .....Rutland, Vt.
Traver, S. N. .....128 Locust St., Harrisburg, Pa.
Trueheart, Marion .....Sterling, Kan.

Valentine, Julius J. .....171 W. 71st St., New York, N. Y.
Van der Poel, John .....56 W. 52d St., New York, N. Y.
Van Riemst, T. S. .....152 W. 73d St., New York, N. Y.
Vecki, Victor G. .....381 Bush St., San Francisco, Cal.

Walker, Edwin .....712 S. 4th St., Evansville, Ind.
Walker, George .....Charles and Center Sts., Baltimore, Md.
Walker, R. S. .....507 Ohio Bldg., Toledo, Ohio
Walsh, Ferdinand C. .....Moore Bldg., San Antonio, Tex.
Ward, Wm. J. .....20 Fairmount Ave., Newark N. J.
Ware, Martin W. F. .....27 E. 81st St., New York, N. Y.
Warren, Geo. W. .....29 E. 44th St., New York, N. Y.
Wathen, John R. .....Gaulbert Bldg., Louisville, Ky.
Watson, Francis S. .....92 Marlborough St., Boston, Mass.
Weber, Harry C. . . Courier . Journal Office Bldg., Louisville, Ky.
Weiss, Ludwig .....42 W. 91st St., New York, N. Y.
Welfeld, Joseph .....209 S. State St., Chicago, Ill.
Westerman, C. M. .1345 Syndicate Trust Bldg., St. Louis, Mo.
Wheeler, Carl L. .....Trust Co. Bldg., Lexington, Ky.
Wheeler, David E. .....391 Delaware Ave., Buffalo, N. Y.
Whiteside, G. S. .....Dekum Bldg., Portland, Ore.
Whiting, J. R. .....200 W. 56th St., New York, N. Y.
Whitney, Chas. M. .....591 Tremont St., Boston, Mass.
Willard, William P. .....177 Post St., San Francisco, Cal.
Williams, A. U. .....Hot Springs, Ark
Williams, Ralph .....501 Douglas Bldg., Los Angeles, Cal.
Wilson, Nelson W. .....49 Niagara St., Buffalo, N. Y.
Windell, J. T. .....715 W. Jefferson St., Louisville, Ky.
Wise, Fred .....828 Lexington Ave., New York, N. Y.
Wishard, Wm. N. . . . Newton-Claypool Bldg., Indianapolis, Ind.
Wolbarst, A. L. .....113 E. 19th St., New York, N. Y.

Wolff, Alexander S. .....601 Century Bldg., St. Louis, Mo.
Wolf, W. B. .....113 W. Franklin St., Baltimore, Md.
Wright, Franklin R. .....Donaldson Block, Minneapolis, Minn.
Wyeth, George .....254 W. 82d St., New York, N. Y.

Youmans, Thos. G. .....112 E. Broad St., Columbus, Ohio
Young, E. B. .....434 Marlborough St., Boston, Mass.
Young, Hugh H. .....212 Professional Bldg., Baltimore, Md.

Zurawsky, K. A. .....32 N. State St., Chicago, Ill.

INDEX.

A case of burn of the urethra with lunar caustic followed by a complete cast of the urethra, 104

A case of malaria simulating renal calculus, 263

A case of unrelieved, unexplained vesical tenesmus, 140

A short account of the early history of suprapubic cystotomy, 305

Albumen determination as an aid in diagnosis of kidney lesions, 41

An instance of acute retention due to an unusual cause, 209

Ayers, Winfield, the micrococcus catarrhalis as a cause of urethritis in the male, 221

Ayers, Winfield, discussion on removal of ureteral stone, 217; on gonorrhœal pyelitis, 249

Barnett, Charles E., some genito-urinary surgery recently done in Vienna and Berlin, 94

Barnett, Charles E., discussion on the training of the urologist, 102; on prostatectomy, 154

Barney, J. Dellinger, the effects of ureteral ligation, experimental and clinical, 251

Barney, J. Dellinger, discussion on perinephritis, 272

Barringer, Benjamin S., and Geo. M. MacKee, radiographs of the bladder and bladder neck, 408

Beal, Howard W., discussion on removal of ureteral stone, 215

Bierhoff, Frederic, discussion on accidental burning of the urethra, 108

Binney, Horace, discussion on removal of ureteral stone, 215

Bladder, diverticulum of the, 58, 84

Boehm, Joseph L., and John McH. Dean, sigmoido-vesical fistula: report of two cases, 386

Boehm, Joseph L., discussion on prostatectomy, 152; on gonorrhœal complement fixation reaction, 381; on micrococcus catarrhalis, 248

Braasch, W. F., discussion on anomalies of the ureter, 212

Burford, C. E., discussion on removal of ureteral stone, 216

Burn of the urethra, 104

Burnam, Curtis F., experimental investigation of the value of hexamethylenamin (urotropin) and allied compounds, 286

Burnam, Curtis F., discussion on value of hexamethylenamin and allied compounds, 304

Cabot, Hugh, the training of the urologist, 87

Cabot, Hugh, discussion on functional tests, 48, 55; on training of the urologist, 103; on prostatectomy, 151

Catheter and cystoscopes, 412

Chute, Arthur L., two cases of diverticulum of the bladder treated by operation, 58

Chute, Arthur L., discussion on diverticulum of the bladder, 84

Clowes, G. H. A., and James A. Gardner, observations on value of specific complement deviation reaction in gonorrhœa, as an aid to clinical diagnosis, 338

Colon bacillus infection of urinary tract, 242

Conclusions drawn from one hundred prostatectomies, 125

Cumston, Charles Greene, a short account of the early history of suprapubic cystotomy, 305

Cumston, Charles Greene, discussion on malaria, 271

Cunningham, J. H., Jr., discussion on removal of ureteral stone, 217

Cystoscopes, 412

Dean, John McH., and Joseph L. Boehm, sigmoido-vesical fistula: report of two cases, 386

Discussion on functional tests in surgery of the genito-urinary tract, 47; on albumen determination as an aid in diagnosis of kidney lesions, 41; on diverticulum of the bladder, 80; on vesical neoplasms, 84; on the training of the urologist, 99; on accidental burning of the urethra, 107; on prostatectomy, 146; on unexplained tenesmus, 155; on anomalies of the ureter, 212; on glass fragments in the bladder, 214; on removal of ureteral stone, 215; on floating kidneys, 219; on micrococcus catarrhalis, 248; on gonorrhœal pyelitis, 249; on malaria, 271; on ureteral ligation, 272; on perinephritis, 272; on gonorrhœal rheumatism, 301; on value of hexamethylenamin and allied compounds, 302; on gonorrhœal complement fixation reaction, 380; on urinalysis, 406

Diverticulum of the bladder, 58

Double ureter, 161

Effects of ureteral ligation, experimental and clinical, 251

Epididymo-orchitis complicating typhoid fever, 111

Experiences with the gonorrhœal complement fixation test, 360

Experimental investigation of the value of hexamethylenamin (urotropin) and allied compounds, 286

Fistulæ, ilio-vesical and appendico-vesical, 397; sigmoido-vesical, 386

Floating kidneys, discussion on, 219

Fowler, O. S., further observations on ureteral obstruction in early intermittent hydronephrosis, 186

Fowler, O. S., discussion on the training of the urologist, 101; on accidental burning of the urethra, 107; on floating kidneys, 219; on value of hexamethylenamin and allied compounds, 304

Fragment of glass irrigating nozzle removed from the bladder without open operation, 207

Fuller, Eugene, the management of gonorrhœal rheumatism, 274

Fuller, Eugene, discussion on prostatectomy, 146; on gonorrhœal rheumatism, 304

Functional tests, 47, 54

Further experience with liquor aluminum acetate in colon bacillus infection of urinary tract, 242

Further observations on ureteral obstruction in early intermittent hydronephrosis, 186

Further report on the gonorrhœal complement fixation reaction, 370

Further report on the phenolsulphonephthalein test in surgery of the genito-urinary tract, 13

Gardner, James A., and G. H. A. Clowes, observations on value of specific complement deviation reaction in gonorrhœa, as an aid to clinical diagnosis, 338

Gardner, James A., discussion on unexplained tenesmus, 155; on gonorrhœal complement fixation reaction, 382

Garceau, Edgar, new occluding ureteral catheter and cystoscopes for functional renal tests, 412

Genito-urinary surgery, 99

Geraghty, John T., discussion on functional tests, 47, 54

Glass fragments in the bladder, 207, 214

Gonorrhœal complement deviation reaction, 338; complement fixation reaction, 360, 370, 382

Gonorrhœal pyelitis, 236, 248

Gonorrhœal rheumatism, 274, 301

Gradwohl, R. B. H., experiences with the gonorrhœal complement fixation test, 360

Gradwohl, R. B. H., discussion on gonorrhœal complement fixation reaction, 383

Guiteras, Ramon, discussion on the training of the urologist, 99, 102

Hagner, Francis R., a case of unrelieved, unexplained tenesmus, 140

Hagner, Francis R., discussion on prostatectomy, 158; on gonorrhœal pyelitis, 249

Harris, Burton, discussion on urinalysis, 406
Heitzmann, Louis, microscopical urinalysis as an aid to diagnosis of diseases of the urinary tract, 401
Heitzmann, Louis, discussion on functional tests, 53; on urinalysis, 407
Hexamethylenamin (urotropin), and allied compounds, value of, 286, 302
Hunner, Guy L., discussion on albumen determination in diagnosis of kidney lesions, 52
Ileo-vesical and appendico-vesical fistulæ complicated by stone in the bladder, 397
Intravenous administration of phenolsulphonephthalein for ureter catheter study of renal function, 31
Jacobson, Henry, perinephritis, 266
Jacobson, Henry, discussion on the training of the urologist, 100; on accidental burning of the urethra, 107; on prostatectomy, 148; on ureteral ligation, 273
Keyes, E. L., Jr., and A. R. Stevens, intravenous administration of phenolsulphonephthalein for ureter catheter study of renal function, 31
Keyes, Edward L., Jr., discussion on the training of the urologist, 99; on micrococcus catarrhalis, 248
Kolischer, Gustave, points in prostatic surgery, 144
Kolischer, Gustave, discussion on functional tests, 55, 56; on diverticulum of the bladder, 82; on prostatectomy, 159; on removal of ureteral stone, 217
Koll, Irvin S., further experience with liquor aluminum acetate in colon bacillus infection of urinary tract, 242
Kretschmer, Herman L., and Louis E. Schmidt, further report on the phenolsulphonephthalein test in surgery of the genito-urinary tract, 13
Kidney lesions, 41, 50, 52
Lauterman, M., discussion on unexplained tenesmus, 156; on ureteral ligation, 272; on gonorrhœal rheumatism, 302; on value of hexamethylenamin and allied compounds, 302; on urinalysis, 406
Lehr, Louis C., report of a case of gonorrhœal pyelitis, 236
Lesions, kidney, diagnosis of, 41
Lewis, Bransford, the removal of ureteral stone by cystoscopic methods, 169
Lewis, Bransford, discussion on functional tests, 50; on prostatectomy, 147; on removal of ureteral stone, 219
Liquor aluminum acetate, 242
List of members of the A. U. A., 425
McCarthy, J. F., vesical neoplasms, 69; 84.
MacKee, Geo. M., and Benjamin S. Barringer, radiographs of the bladder and bladder neck, 408
Malaria, 263, 271
Management of gonorrhœal rheumatism, 274
Micrococcus catarrhalis as a cause of urethritis in the male, 221
Microscopical urinalysis as an aid to diagnosis of diseases of the urinary tract, 401
Neoplasms, vesical, 69, 84
New occluding ureteral catheter and cystoscopes for functional renal tests, 412
Observations on value of specific complement deviation reaction in gonorrhœa, as an aid to clinical diagnosis, 338
Pedersen, Victor Cox, a case of burn of the urethra with lunar caustic followed by a complete cast of the urethra, 104
Pedersen, Victor C., fragment of glass irrigating nozzle removed from the bladder without open operation, 207
Pedersen, Victor C., discussion on burning of the urethra, 109; on value of hexamethylenamin and allied compounds, 303
Perinephritis, 266
Phenolsulphonephthalein test in surgery of the genito-urinary tract, 13; for ureter catheter study of renal function, 31

Pilcher, Paul M., ileo-vesical and appendico-vesical fistulæ complicated by stone in the bladder, 397
Pilcher, Paul M., discussion on prostatectomy, 153
Points in prostatic surgery, 144
Prostatectomies, one hundred, 125
Prostatectomy, the time for, 119, 125
Prostatic surgery, points in, 144
Pyelitis, gonorrhœal, 236
Radiographs of bladder and bladder neck, 408
Removal of ureteral stone by cystoscopic methods, 169
Report of a case of double ureter with intravesical ballooning of its lower ends, 161
Report of a case of gonorrhœal pyelitis, 236
Retention, acute, 209
Rheumatism, gonorrhœal, 274, 301
Robbins, Frederick W., discussion on gonorrhœal complement fixation reaction, 383
Roster of the American Urological Association, 425
Sanford, Henry L., discussion on functional tests, 49
Schapira, S. William, discussion on functional tests, 49
Schmidt, Louis E., why urology should be considered a specialty, 1
Schmidt, Louis E., further report on the gonorrhœal complement fixation reaction, 370
Schmidt, Louis E., discussion on functional tests, 57; on the training of the urologist, 102
Schmidt, Louis E., and Herman L. Kretschmer, further report on the phenolsulphonephthalein test in surgery of the genito-urinary tract, 13
Sigmoido-vesical fistula: report of two cases, 386
Smith, E. E., discussion on albumen determination in diagnosis of kidney lesions, 50
Smith, E. O., a case of malaria simulating renal calculus, 263
Smith, George C., epididymo-orchitis complicating typhoid fever, 111
Smith, Oliver C., conclusions drawn from one hundred prostatectomies, 125
Smith, Oliver C., discussion on prostatectomy, 157
Some genito-urinary surgery recently done in Vienna and Berlin, 94
Stevens, A. R., and E. L. Keyes, Jr., intravenous administration of phenolsulphonephthalein for ureter catheter study of renal function, 31
Suprapubic cystotomy, early history of, 305
Surgery of the urinary tract, phenolsulphonephthalein test in, 13
Swinburne, George K., discussion on functional tests 50; on accidental burning of the urethra, 108; on prostatectomy, 150; on glass fragments in the bladder, 214; on gonorrhœal rheumatism, 301; on gonorrhœal complement fixation reaction, 380
Ten Broeck, Louis L., discussion on gonorrhœal complement fixation reaction, 383
Tenesmus, unexplained, 140, 156
Tenney, Benjamin, the time for prostatectomy, 119
Tenney, Benjamin, discussion on prostatectomy, 157
Time for prostatectomy, 119
Townsend, William Warren, an instance of acute retention due to an unusual cause, 209
Training of the urologist, 87
Two cases of diverticulum of the bladder treated by operation, 58
Typhoid fever complicated by epididymo-orchitis, 111
Ureter, anomalies of the, 161, 212
Ureter, double, 161
Ureter catheter study of renal function, 31
Ureteral catheter and cystoscopes, 412
Ureteral ligation, effects of, 251, 272
Ureteral obstruction, 186
Ureteral stone, removal of, 169, 215
Urethra, burning of, 104, 107
Urethra, cast of the, 104
Urethritis in the male, micrococcus catarrhalis as a cause of, 221
Urinalysis, 401, 406

Urologist, training of the, 87, 99
Urology, why considered a specialty, 1
Vesical neoplasms, 69
Walker, Dr., discussion on the training of the urologist, 100
Warren, George W., albumen determination as an aid in diagnosis of kidney lesions, 41
Warren, George W., discussion on albumen determination in diagnosis of kidney lesions, 57
Ware, Martin W., discussion on functional tests, 52, 56; on diverticulum of the bladder, 82; on accidental burning of the urethra, 107; on prostatectomy, 155; on anomalies of the ureter, 213
Why urology should be considered a specialty, 1
Young, Hugh Hampton, report of a case of double ureter with intravesical ballooning of its lower ends, 161
Young, Hugh H., discussion on diverticulum of the bladder, 80; on prostatectomy, 148; on anomalies of the ureter, 218

RC
870
A49
v.6
Biological
& Medical
Serials

American Urological
Association
Transactions

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

STORAGE